A Dissertation on

"A RANDOMISED CONTROLLED STUDY COMPARING THE ANALGESIC EFFICACY OF EPIDURAL ANALGESIA WITH USG GUIDED FASCIA ILIACA COMPARTMENT BLOCK FOR FEMUR SURGERY DONE UNDER SUB ARACHNOID BLOCK "

submitted to

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IN

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DEPARTMENT OF ANAESTHESIOLOGY

& CRITICAL CARE

STANLEY MEDICAL COLLEGE

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DECLARATION BY THE CANDIDATE

I hereby declare that the dissertation entitled "**A RANDOMISED CONTROLLED STUDY COMPARING THE ANALGESIC EFFICACY OF EPIDURAL ANALGESIA WITH USG GUIDED FASCIA ILIACA COMPARTMENT BLOCK FOR FEMUR SURGERY DONE UNDER SUB ARACHNOID BLOCK**" has been prepared by me under the Guidance of **Prof. Dr KUMUDHA LINGARAJ, M.D., D.A.,** Professor of Anaesthesiology, Department of Anaesthesiology, Stanley Medical College, Chennai, in partial fulfilment of the regulations for the award of the degree of M.D(ANAESTHESIOLOGY), examination to be held in April 2016.

This study was conducted at Department Of Anaesthesiology, Stanley Medical College, Chennai.

I have not submitted this dissertation previously to any university for the award of any degree or diploma.

Date :

Place : Chennai DR. KOUSALYA. T

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled, "**A RANDOMISED CONTROLLED STUDY COMPARING THE ANALGESIC EFFICACY OF EPIDURAL ANALGESIA WITH USG GUIDED FASCIA ILIACA COMPARTMENT BLOCK FOR FEMUR SURGERY DONE UNDER SUB ARACHNOID BLOCK**" submitted by Dr. KOUSALYA.T, under the guidance of **Prof. Dr KUMUDHA LINGARAJ, M.D., D.A.,** in partial fulfilment for the award of the degree of Doctor of Medicine in Anaesthesiology by The Tamilnadu Dr.M.G.R.Medical university , Chennai is a bonafide record of the work done by her in the DEPARTMENT OF ANAESTHESIOLOGY & CRITICAL CARE, Stanley Medical College, during the academic year 2013-2016.

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Background: Peroperative analgesia in surgeries involving femur fractures has been a challenge to the Anaesthesiologist since ages. Perineural analgesia is becoming popular as it provides comparable pain relief and decreases the side effects associated with central neuraxial blockade. We decided to compare the analgesic efficacy of ultrasound guided fascia iliaca compartment block with epidural block for postoperative pain relief in patients undergoing femur surgery under sub arachnoid block.

Aim : To compare the analgesic efficacy of Continuous Epidural block with Continuous Fascia Iliaca Compartment Block for femur surgery done under subarachnoid block.

Methods : A total of 120 (n=120) consented patients fulfiling the inclusion criteria who underwent elective surgery for fracture femur were selected. They were randomized to group F (n = 60) and group E (n = 60) to receive either Fascia iliaca compartment block or Epidural block respectively for postoperative analgesia. The technique of spinal anaesthesia were standardised in both the groups. Group E patients received epidural catheter at the time of spinal anaesthesia preoperatively . Group F patients received fascia iliaca catheter at the end of procedure. 20 ml of 0.125% bupivacaine injected via the catheter in the group F patients. In the recovery room both Group F and Group E were started with continuous infusion of 0.125% bupivacaine via catheter at the rate of 8ml/hr for 24 hours .

Results : There was no substantial demographic difference between both the groups. The mean VAS score in both the groups were comparable.. The other hemodynamic parameters and side effects were comparable between both the groups.

Conclusion : We arrived at a conclusion that the FICB holds considerable promise as an effective postoperative analgesia with less side effects compared to Epidural analgesia.

Keywords : Epidural analgesia, Fascia iliaca compartment block, bupivacaine, postoperative analgesia.

INTRODUCTION

Femur fractures cause moderate to severe pain which requires effective analgesia both preoperatively and postoperatively[1]. Multimodal analgesic regimens which include Non steroidal anti-inflammatory drugs, opioids & various regional analgesic techniques have been used in femur surgeries so far. NSAIDs even in moderate dose cause adverse effects, especially in the elderly population[2]. Although opioids are potent analgesics, they are associated with serious adverse effects like drowsiness, nausea, respiratory depression, constipation etc. limiting their use[3].

Epidural analgesia is considered by many as the gold standard analgesic technique for femur surgeries[4]. Apart from effective analgesia it decreases the neuro-endocrine stress response, central sensitization & muscle spasm that occur in response to painful stimuli[5]. There is a substantial evidence showing reduced blood loss and fewer thromboembolic complications following neuraxial blockade[6,7,8].

However Lumbar epidural analgesia is also commonly associated with various problems like hypotension, urinary retention, undesired bilateral sensory and motor blockade and delay in mobilization.

Perineural analgesia is becoming popular as it provides comparable pain relief and decreases the side effects associated with central neuraxial

blockade[9]. Peripheral nerve blockade was initially done with either paresthesia technique or nerve stimulation based technique. Ultrasound guided needle & catheter placement is observed to be technically superior, more accurate, being placed in peripheral location probably increases the safety of such techniques compared with others.

Fascia iliaca compartment block was initially described by Dalens et al[10] on children using landmark technique. It is relatively simple, easier to perform, and provides perioperative analgesia in patients with painful conditions affecting the thigh, hip joint and femur. The use of ultrasound to aid identification of the fascial planes may lead to faster onset and dense motor blockade. This increases the rate of successful blocks[11].

Taking all these into consideration, we decided to conduct a prospective randomized controlled study at Government Stanley Medical College hospital, comparing the analgesic efficacy of ultrasound guided fascia iliaca compartment block with epidural block for postoperative pain relief in patients undergoing femur surgery under subarachnoid block.

AIM OF THE STUDY

To compare the analgesic efficacy of Continuous Epidural block with Continuous Fascia Iliaca Compartment Block for femur surgery done under subarachnoid block.

OBJECTIVES

Primary outcome measures:

Assessment of the postoperative pain by Visual Analogue scale

Secondary outcome measures:

a. Postoperative Nausea and vomiting

b. Rescue Analgesic requirement

c. Patient satisfaction

d. Therapeutic / technical failure rate

e. Complications

EPIDURAL ANATOMY AND TECHNIQUES

Anatomy[12,13]

It is a potential space that lies between the dura and the periosteum lining the vertebral canal. It extends from the foramen magnum to the sacral hiatus. The anterior and posterior nerve roots with their dural covering pass across this potential space to unite in the intervertebral foramen to form segmental nerves. The space contains venous plexuses and fatty tissue, which is continuous with the fat in the paravertebral space.

Boundaries[14]

i. The anterior border consists of the posterior longitudinal ligament covering the vertebral bodies and the intervertebral discs.

ii. Laterally, the epidural space is bordered by the periosteum of the vertebral pedicles and the intervertebral foraminae.

iii. Posteriorly, the bordering structures are the periosteum of the anterior surface of the laminae and articular processes and their connecting ligaments, the root of the spines.

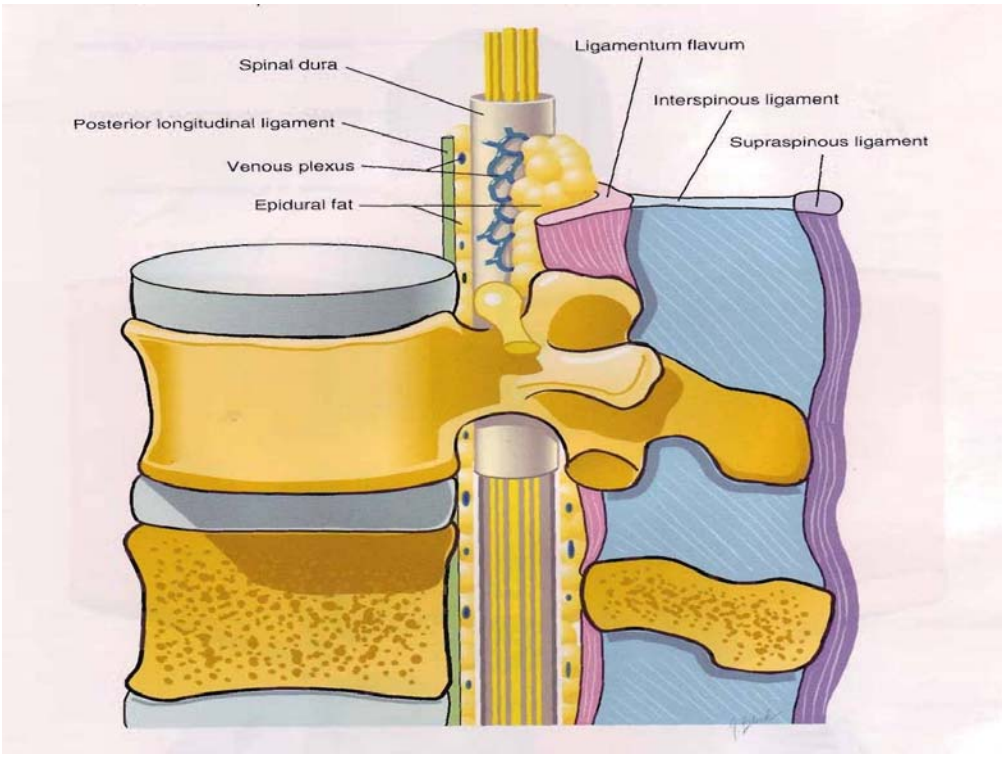

Figure 1. Epidural Space Anatomy

EPIDURAL ANESTHESIA[15]

Introduction

The epidural space was first described by Corning in 1904. Fidel Pages first used epidural anaesthesia in humans in 1921. In 1945, Tuohy introduced the needle which is called as Tuohy epidural needle.

Indications

(i) Sole anaesthesia for the lower limbs, pelvis, perineum and lower abdomen surgeries.

(ii) Upper abdominal and thoracic surgeries under thoracic epidural anaesthesia

(iii) Postoperative analgesia

Contraindications[16]

Absolute Contraindications

- Patient refusal
- Coagulopathy
- Severe hypovolemia
- Bleeding disorders
- Raised intracranial pressure.

Relative Contraindications

- Uncooperative patients
- Patient with progressive neurological disorders
- Infection at the site of injection
- Fixed cardiac output states like aortic stenosis, Hypertrophic obstructive cardiomyopathy (HOCM), Mitral stenosis and complete heart block.
- Anatomical abnormalities of vertebral column
- Prophylactic low dose heparin

Technique of Epidural Anaesthesia

Preparation

1. Obtain informed consent.
2. Pre-anaesthetic assessment
3. An epidural must be performed in a work area that is equipped for airway management and resuscitation.
4. Facilities for monitoring
5. Performed with aseptic precautions

Equipment

- The epidural needle called Tuohy needle is 16-18G, 8cm long with surface markings at 1cm intervals, and has a blunt bevel with a 15-30 degree curve at the tip that is Huber tip. Epidural catheters have either a single end-hole or a number of side holes at the distal end. A needle hub insert to be used to thread the catheter. A reinforced catheters are available to prevent buckling

- Glass syringe with plunger or plastic syringe to identify epidural space by means of loss of resistance or hanging drop technique.

- Test dose in 5ml syringe

- Povidone solution with sponge holder

- Strerile drapes, gauzes, and adhesive tapes

TECHNIQUES OF EPIDURAL BLOCKADE

Midline Approach[17]:

Patient is placed in the lateral position. Under aseptic precaution, skin is infiltrated with local anaesthetic solution upto the interspinous ligament. 18 Gauge Tuohy epidural needle is inserted in the midline. Testing syringe is attached to the needle. After piercing through the supraspinous, interspinous, ligamentum flavum, the epidural space is identified by "loss of resistance technique" to air[19]. Then a gentle aspiration is done and test dose of 3 ml of 2 % lignocaine with 1:200000 of Adrenaline is injected. 19 Gauge multi port catheter is inserted and fixed at the depth of 5 cm within the epidural space

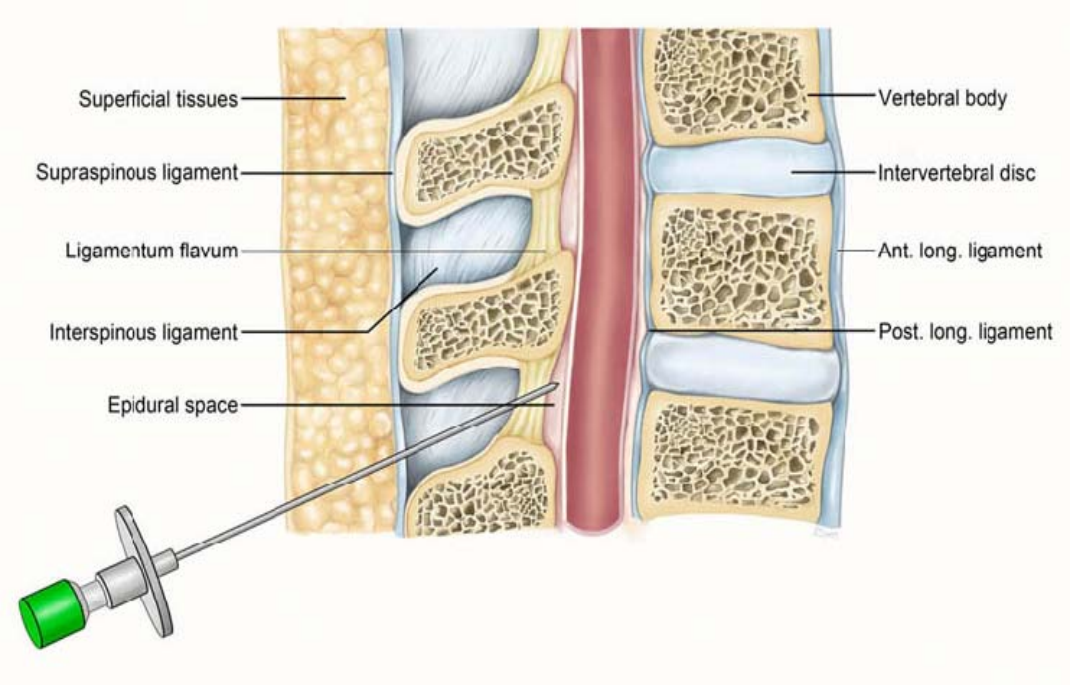

Figure 2 Midline Approach

Paramedian Approach

- Insert needle 1-2cm lateral to the spinous process of vertebra.
- Advance the needle, perpendicular to the skin until the lamina or pedicle is encountered
- Redirect it approximately 30° cephalad and 15° medially in an attempt to "walk the needle" off the lamina
- This method bypasses supraspinous and interspinous ligaments.

Test dose[20]

- Ideal test dose contains 15mcg of 1:200,000 adrenaline and 3ml of LA
- It should identify both intravascular and intrathecal placement
- Effective doses of
    - Lignocaine- 45mg
    - Bupivacaine- 15mg
    - Ropivacaine- 16mg

- Criteria for positive epinephrine test (ASRA 2001)

Table 1. Criteria for Positive Epinephrine Test

Patient <60 years not on beta blockers	HR increase > 20 bpm SBP increase > 15 mmHg
Patient < 60 years on beta blockers	SBP increase >15 mmHg
Age > 60 years	HR increase > 9 bpm SBP increase >15 mmHg
Under GA	HR increase >8 bpm SBP increase > 13 mmHg

- Intrathecal placement can be identified by the presence of motor blockade of great toe.

Volume[21] :

- Volume of LA solution injected per number of dermatomes blocked and for each pair of segments the recommendations are
  - ✓ Cervical- 1.5ml
  - ✓ Thoracic- 2ml
  - ✓ Lumbar- 2.5ml
- For single injection technique 15 to 20 ml of LA solution is recommended.
- For continuous technique initial bolus volume of 8 to 12 ml followed by 5 to 7 ml every hour.

Site of Action

- Three sites
    - ✓ On the nerves as they transverse epidural space
    - ✓ On the nerves in the intervertebral foramina
    - ✓ On the nerves in the subarachanoid space after diffusion through the dura
- The main site of action is considered to be on the nerves in the intervertebral foramina

Physiological Effects[18]

- The segmental nerves in the thoracic and lumbar region contain somatic sensory, motor and autonomic (sympathetic) nerve fibers.
- Sensory and autonomic fibers have a smaller diameter and are more easily blocked than larger, more rapidly-conducting motor fibers.
- Sympathetic block usually extends 1-2 levels higher than sensory block.
- Sensory block extends 2 levels higher than the motor block
- Vasodilatation of resistance and capacitance vessels occur, with a resultant drop in blood pressure.
- Exacerbated by blockade of the sympathetic nerve supply to the adrenal glands, preventing the release of catecholamines.

- If blockade is as high as T2, sympathetic supply to the heart (T2-5) is also interrupted and may lead to bradycardia.

- Overall result may be inadequate perfusion of vital organs and measures are required to restore the blood pressure and cardiac output, such as fluid administration and the use of vasoconstrictors.

- Sympathetic outflow extends from T1 - L2 and blockade of nerve roots below this level, is less likely to cause significant sympathetic blockade

Complications:

The complications can be

- Technical related
- Catheter related
- Clinical complications

Technique Related

- Inadvertent dural puncture
- Subdural Injection
- Vascular injury on catheter insertion

Catheter Related:

- Migration of catheters
- Extrusion of catheters
- Paresthesia on insertion of catheter

Clinical Complications

- Hypotension
- Local anesthetic toxicity, reactions
- Neurologic sequelae
- Failure of block
- Miscellaneous-Epidural Hematoma, Epidural abscess, backache

ULTRASONOGRAM

Ultrasound usage in regional anesthesia is relatively new, however interest in this application is growing rapidly. It has advantages of

i. Visualizing the nerve location and the surrounding vascular, bony, muscular, and visceral structures. Provides real-time imaging guidance during needle advancement allowing for proper needle movement and adjustments in direction and depth.
ii. Images the local anesthetic spread pattern during injection. Improves the quality of sensory block, the onset time, and the success rate compared to nerve stimulator techniques
iii. Reduces the number of needle attempts for nerve localization which may prove to reduce the risk of nerve injury. Eliminate intraneural and intravascular injections.

Principles

Ultrasound is sound wave with frequency above the audible range. Frequencies used in clinical imaging are in the range of 1 to 20 MHz. Ultrasound waves have velocity of 1540 ms in soft tissues.

Piezoelectric Effect

Ultrasound imaging is based on the transmission and reflection of longitudinal high frequency ultrasonic waves. The production of ultra sonic waves from transducers when a voltage is applied works on the principle of piezoeletctric effect.

The ultra-sonogram transducer converts one type of energy into another. When the transducer converts electrical energy into extremely rapid mechanical vibration that are very high sounds to hear. The electrical field required is formed when a voltage is applied between the surfaces of 2 electrodes. This causes a dimensional change in the crystals. Conversely when the mechanical vibrations from the tissues is reflected back to the transducer they compress the crystals and generate an electrical potential. This is defined as the pulse echo principle.

Based on the pulse echo principle transducers convert,

Electrical into mechanical (sound) = pulse

Mechanical (sound) into electrical potential = echo.

Pulse

Pulse is the wave that is sent to the soft tissues. Bio-effect is the interaction of pulse wave with soft tissue. Pulsing is determined by transducer or probe crystal.

Echo

The wave produced by the soft tissue is called the echo. The echoes are received back by the transducer crystal. The ultra-sonogram machine interprets and processes these images.

Frequency

The number of cycles completed per unit time. Transducer frequencies are as follows

- 2.5 to 3.5 MHz = Abdomen, Obstetrics and gynaecology
- 5 to 7.5 MHZ = Breast, thyroid
- 7.5 to 10 MHz = Superficial structures.

Wavelength

It is the distance between consecutive cycles of sound. A range of frequencies is known as bandwidth.

Anisotropy in nerve imaging

Anisotropy is a major property of ultrasound imaging. This describes the different echogenicity of soft tissues such as nerves and tendons, when the angle of the transducer is altered. Nerve fibers look hyper echoic (bright) when the transducer is perpendicular. But can appear hypoechoic if the transducer is angled obliquely.

Image Resolution

The main aim of the ultrasound technique after image formation is good resolution. This resolution includes axial/lateral resolution, contrast of the image, spatial and temporal resolution.

Spatial compound imaging

Spatial compound imaging combines multiple lines of insonation within a planar scan to produce a single image. It defines clearly the nerve borders and tissue planes. It also improves the visibility of the needle tip over a limited range of needle angles.

Machine components

1) Transducer Types
    a) Mechanical
        i) Oscillating
        ii) Rotating.

b) Electronic.

i) Linear arrays

ii) Curved arrays

iii) Phase arrays

2) Receiver

3) Memory

4) Display

Figure 3 esovite ultrasonagram

Field of View

Sector FOV: Produced by oscillating/rotating curved arrays, phased arrays. Sector FOV is used in cardiac and abdominal applications.

Linear FOV: Produced by linear arrays. Linear FOV is commonly used in superficial applications.

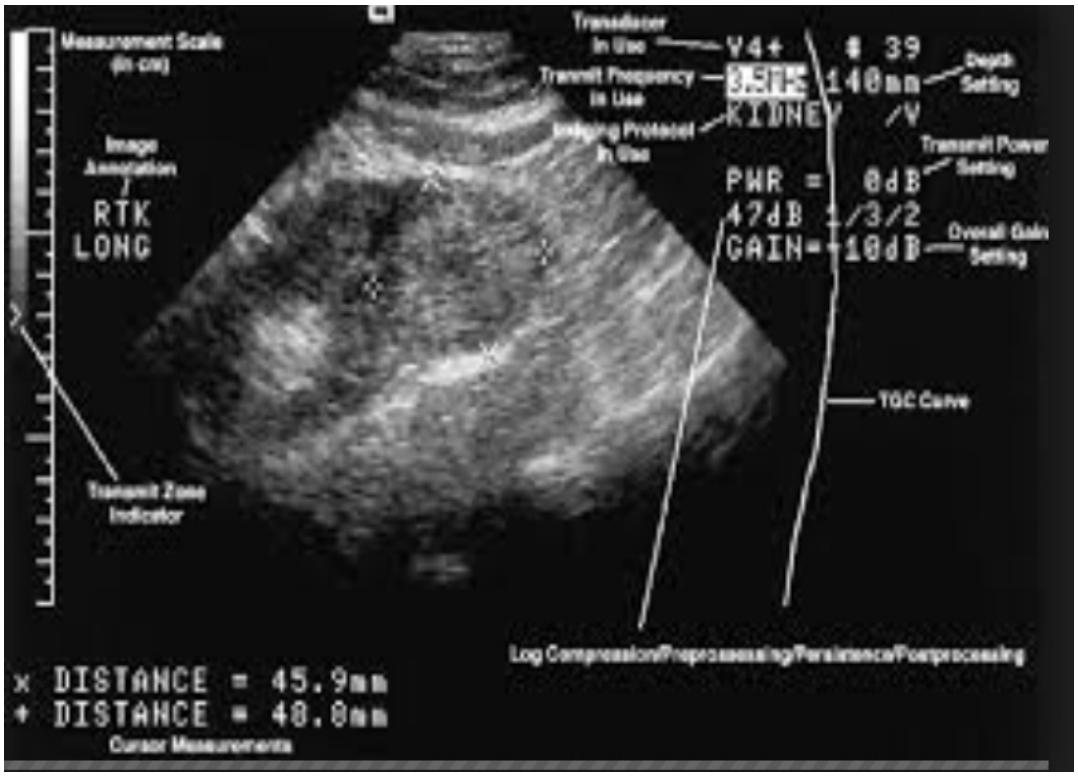

Figure 4 Sector FOV

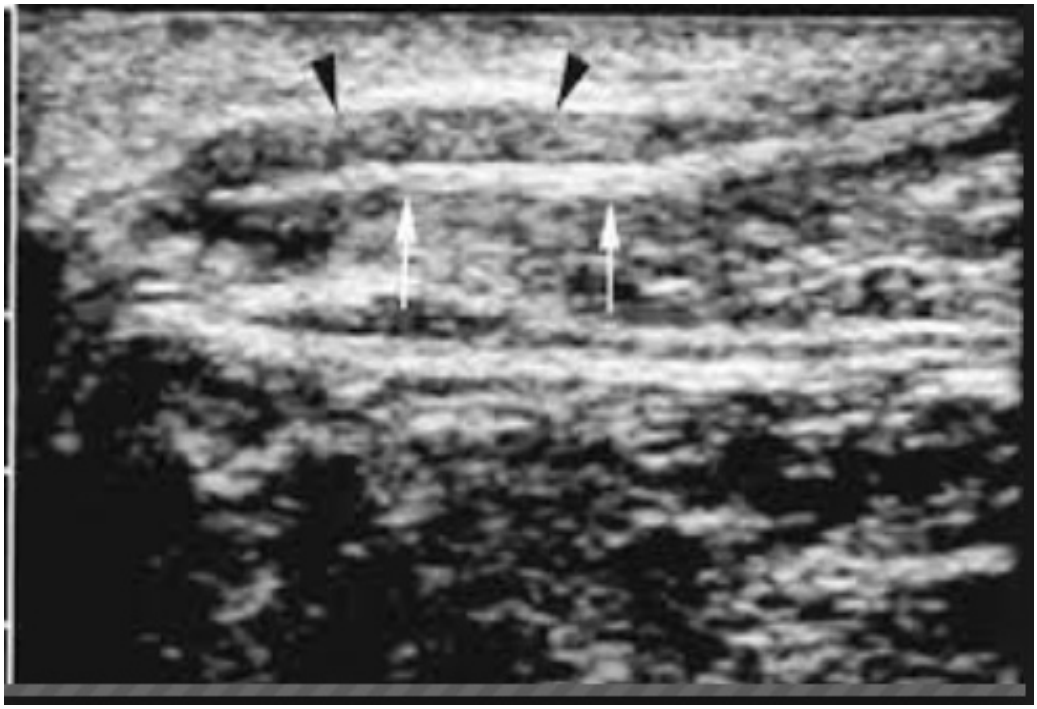

Figure 5 Linear FOV

Ultrasound transducers and manipulation

Ultrasound transducers with high frequency broadband linear probe producing linear arrays have proven to be most useful for nerve imaging. Images from linear arrays are displayed in a rectangular format. One of the essential skills to acquire for USG guided regional nerve blocks is transducer manipulation.

Manipulations are

1. Sliding (moving contact) – Sliding the transducer along the nerve course using a short axis view often helps with nerve identification.

2. Tilting (cross plane, side to side) – The echo brightness of peripheral nerves varies with a degree of tilt. Optimizing this angle is critical to promote nerve visibility.

3. Compression: Compression is often used to confirm venous structures. To improve imaging, compression not only provides better contact but also brings the structures closer to the surface of the transducer.

4. Rocking (in-plane, towards/away from the indicator) – Rocking is often used to improve needle and anatomy structures.

5. Rotation: Some rotation of the probe will produce true short axis views rather than oblique or long axis views.

Probe Types:

Figure 6. Curvilinear, low frequency probe:

Figure 7: Linear High Frequency Probe[22]

Display Modes

First imaging modality used with USG was A mode (amplitude). Today most of the imaging is with B mode (brightness). It is a 2 dimensional image.

M Mode (motion) – This mode records echo's from the heart. This could be interpreted in terms of myocardial and valvular function.

Doppler – The frequency shift in echo is measured after a certain time.

Colour Doppler – Uses colour corresponding to frequency shift. Red is for near to and blue for away from the probe.

Nerve Imaging with ultrasound[23]

Fascicles of peripheral nerves can be detected with high resolution ultrasound imaging. This fascicular echo texture also known as honeycomb architecture is the most distinguishing feature of nerves. High ultrasound frequencies around 10 MHz are required to distinguish nerves from tendons based on the echo texture alone. To identify nerve fascicles a broad linear transducer is made to slide over the known course of a peripheral nerve in short axis view. Along with nerve imaging, identification of nearby structures are also important. During local anaesthetic injection, the favorable distribution of drug and delineation of nerve can be visualized.

Table 2. Imaging of Various Structures

Tissue	Ultrasound Image For Regional Anesthesia
Veins	anechoic (compressible)
Arteries	anechoic (pulsatile)
Fat	hypoechoic with irregular hyperechoic lines
Muscles	heterogeneous (mixture of hyperechoic lines within a hypoechoic tissue background)
Tendons	predominantly hyperechoic technical artifact (hypoechoic)
Bone	++ hyperechoic lines with a hypoechoic shadow
Nerves	hyperechoic / hypoechoic technical artifact (hypoechoic)

Block Needles for USG guided procedures[23]

Needle tip visibility is best when the needle path is parallel to the active phase of the transducer and is perpendicular to the sound beam, so strong specular reflections will be produced. As the angle of incidence is increased, mean brightness will decrease. Bevel orientation does influence the needle tip, with best visibility with the bevel either directly facing or averting the transducer. Because needle diameters are smaller than the scan plane, larger needles are more echogenic than smaller ones.

FASCIA ILIACA COMPARTMENT BLOCK

Anatomy[12,13] :

Nerve supply of the lower extremity

1) Femoral nerve
2) Sciatic nerve
3) Obturator nerve
4) Lateral femoral cutaneous nerve

Femoral nerve, lateral cutaneous nerve, obturator nerve all originates from lumbar plexus. The sciatic nerve arises from lumbar as well as the sacral plexus (lumbosacral plexus).

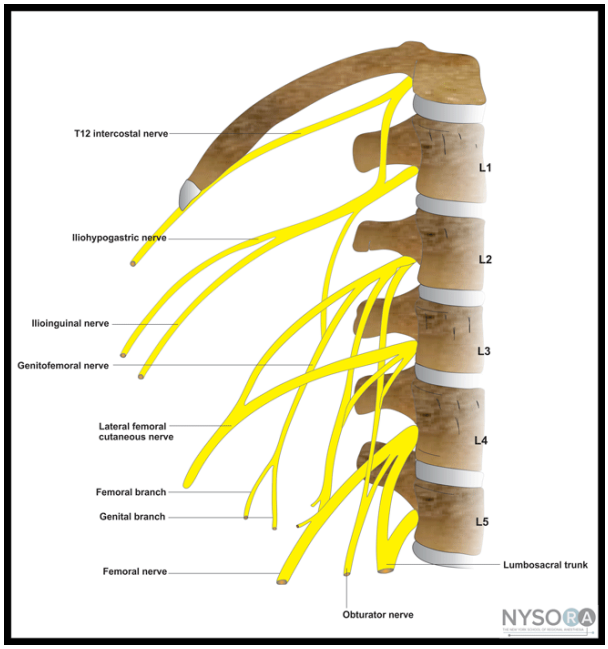

Figure 8: ANATOMY OF LUMBAR PLEXUS

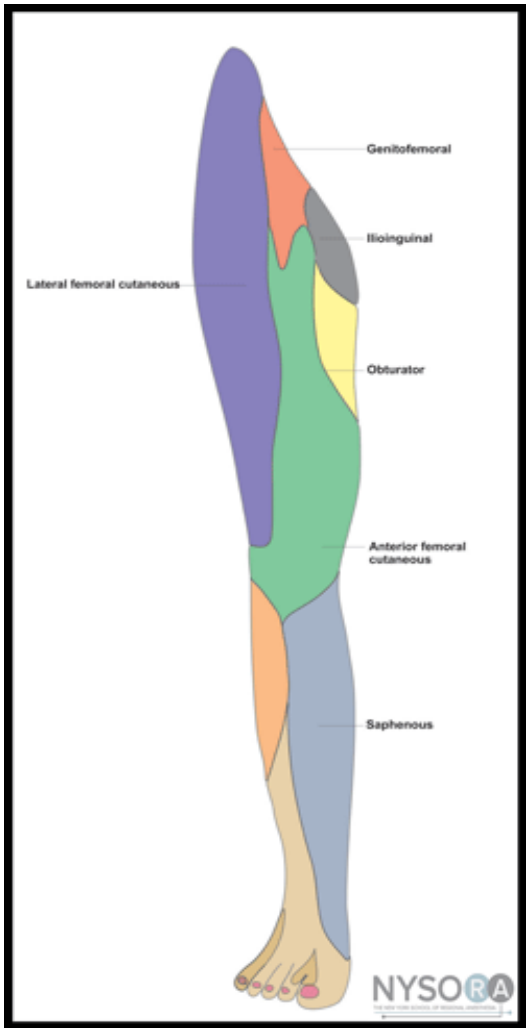

Figure 9:
Sensory Innervation of Lower Limb

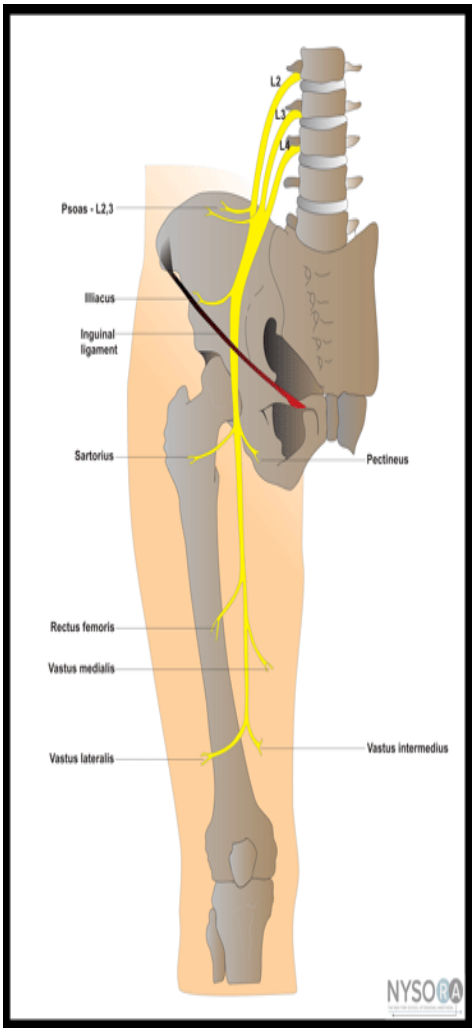

Figure 10.
Motor Innervation of Lower Limb

Femoral Nerve

This is the largest branch of the lumbar plexus, arises from the posterior division of the anterior rami of L2, L3, L4. It descends through the psoas major and emerges from its lateral border, continues caudally between psoas major and iliacus. Behind the inguinal ligament it enters the thigh, lying lateral to the femoral artery where it divides into anterior and posterior divisions and above the iliacus muscle. It is separated from the artery by the fascia iliaca. In the thigh cutaneous branches arises that innervate the anteromedial surface of the thigh. The saphenous nerve, branch from posterior division supplies the skin of medial aspect of the lower leg, ankle, foot and gives motor supply to knee extensors.

Obturator Nerve

Originates from anterior division of the anterior rami of L2, L3, L4. It emerges at the medial border of psoas major, enters the thigh through the obturator foramen, it divides into anterior and posterior branches. The anterior branch supplies the adductor longus, brevis, gracilis and hip joint. Posterior branch supplies obturator externus, adductor magnus, brevis and knee joint. Accessory obturator nerve arises from L3, L4 and it is present in about 30% of cases.

Lateral Femoral Cutaneous Nerve

Originates from L2, L3 emerges from lateral border of psoas major, passing behind the inguinal ligament runs towards the anterior superior iliac

spine. Entire course covered by fascia illiaca. In the thigh it divides into terminal cutaneous branches and supplies the lateral aspect of thigh.

Sciatic Nerve

Originates from L4 to S3 via lumbosacral plexus. It supplies the flexor compartment of thigh and muscles below the knee by means of tibial and common peroneal nerves. The sensory supply follows motor supply except in the medial aspect of lower leg, which is supplied by saphenous nerve. By fascia iliaca compartment injections, it is not possible to block sciatic nerve.

Iliacus Muscle

The iliacus muscle is a large, flat, triangular muscle that lines and fills the ilium. It originates from all along the upper portions of the ilium, iliac crest, sacrum, iliolumbar ligaments. It joins with the lateral side of the psoas muscle together called as iliopsoas. The iliopsoas muscle exits the pelvis beneath the inguinal ligament, wraps around the proximal neck of femur & inserts into the lesser trochanter, acting as a powerful hip flexor.

The Fascia Iliaca [28]:

Fascia iliaca lines the posterior abdomen and pelvis, from the lower thoracic vertebra to the anterior thigh. Forms the posterior wall of femoral sheath, covers psoas major and iliacus muscle in the femoral triangle covered by fascia lata. Fascia covering of the iliopsoas is thin superiorly, becoming significantly thicker as it reaches the level of inguinal ligament which is the reason for a pop up as the needle tip is passed through the fascia.

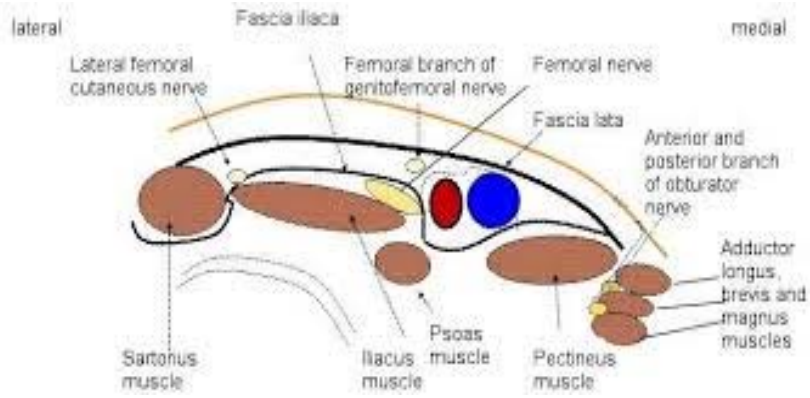

Figure 11: Fascia Illiaca Compartment

Attachments

- Medial – vertebral column, pelvic brim, pectineal fascia
- Lateral – thoracolumbar fascia, iliac crest, sartorious fascia, anterior superior iliac spine
- Anterior – posterior part of inguinal ligament, fascia lata

Fascia Iliaca Compartment

It is a potential space with the following limits

- Anteriorly - posterior surface of the fascia iliaca
- Posteriorly –anterior surface of the iliacus and psoas major
- Laterally – inner lip of the iliac crest
- Medially –vertebral column

This compartment contains three of four major nerves (femoral nerve, lateral cutaeneous nerve of thigh ,obturator nerve) to the leg. Deposition of local anesthetics in this compartment reliably reaches the femoral & lateral cutaneous nerve only.

Sono Anatomy[24] :

By placing high frequency linear usg probe at the level of inguinal ligament identify the femoral artery, femoral vein, lateral and deep to the both vessels there will be a large hypoechoic structure iliopsoas muscle which is covered by thin layer of fascia. This fascia separates the muscle from subcutaneous tissue. Lateral to the femoral artery, between iliopsoas muscle and fascia iliaca there will be a hyperechoic structure which is the femoral nerve. On moving the transducer laterally we will be able to see the Sartorius muscle and its fascia, further movement reveals the anterior superior iliac spine.

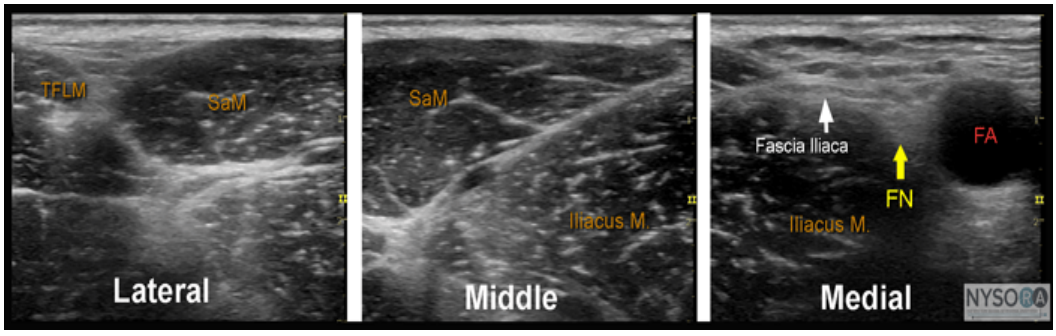

Figure 12: Sonoanatomy Of Fascia Iliaca Block

Indications

- Perioperative analgesia for fracture neck or shaft of femur
- Adjuvant analgesia for hip surgery
- Analgesia for above knee amputation
- Analgesia for plaster applications in children with femoral fracture
- Analgesia for knee surgery along with sciatic nerve block

Contraindications

- Patient refusal
- Patient on anticoagulations
- Infection over injection site
- Allergy to local anesthetics
- Previous femoral bypass surgery

General Considerations

Fascia iliaca block is simple to perform , alternative to a femoral nerve or lumbar plexus block. The mechanism is that femoral and lateral femoral cutaneous nerves lies under the fascia iliaca. Therefore, local anesthetics deposited beneath the fascia iliaca in a sufficient volume, has the potential to spread underneath the fascia, reach these nerves, even if placed some distance from the nerves. It was thought that the drug could also spread proximally towards the lumbosacral plexus, but this has not been demonstrated consistently.

LANDMARK TECHNIQUE :(Double Pop-up Technique)

- A line is drawn between anterior superior iliac spine and pubic tubercle ,
- Divide the line into three equal parts . Needle entry point is 1cm caudal from the junction of the lateral and middle third.
- Introduce 18G Tuohy needle at an angle of 75 degree with the skin ,can feel two pops as it pierce through fascia lata and fascia iliaca.
- Then reduce the angle to 30* and introduce the needle cephalad further 1cm
- 19G epidural catheter is introduced 15cm beyond the tip of the needle
- After negative aspiration, slowly inject local anesthetics aspirating every 5ml.
- Success of block with this technique is sporadic hence false pop ups can occur.

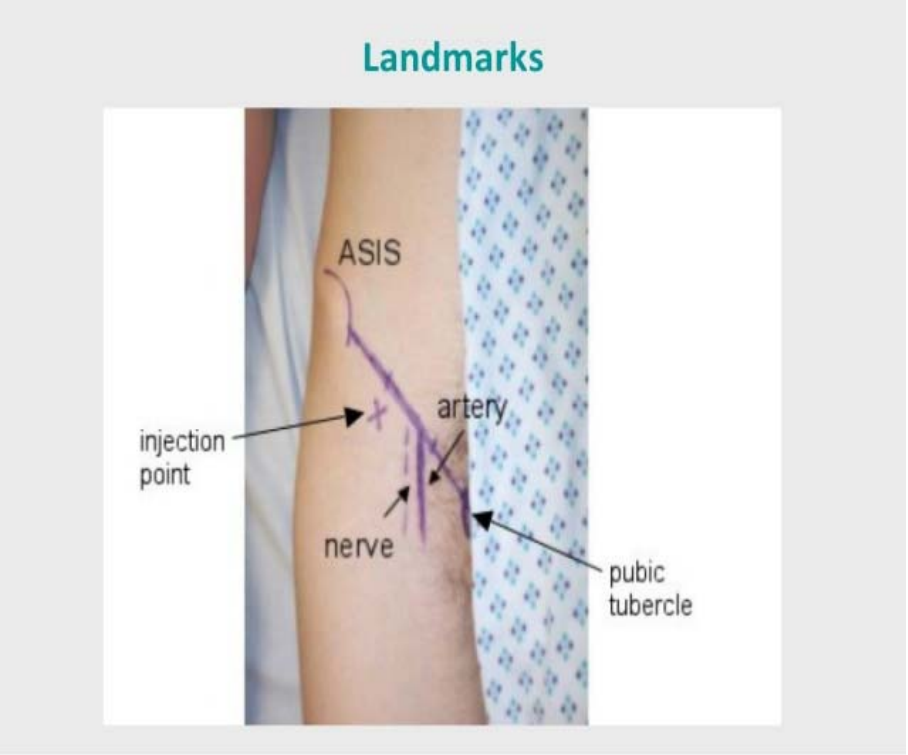

Figure 13. Landmarks Of Fascia Iliaca Block

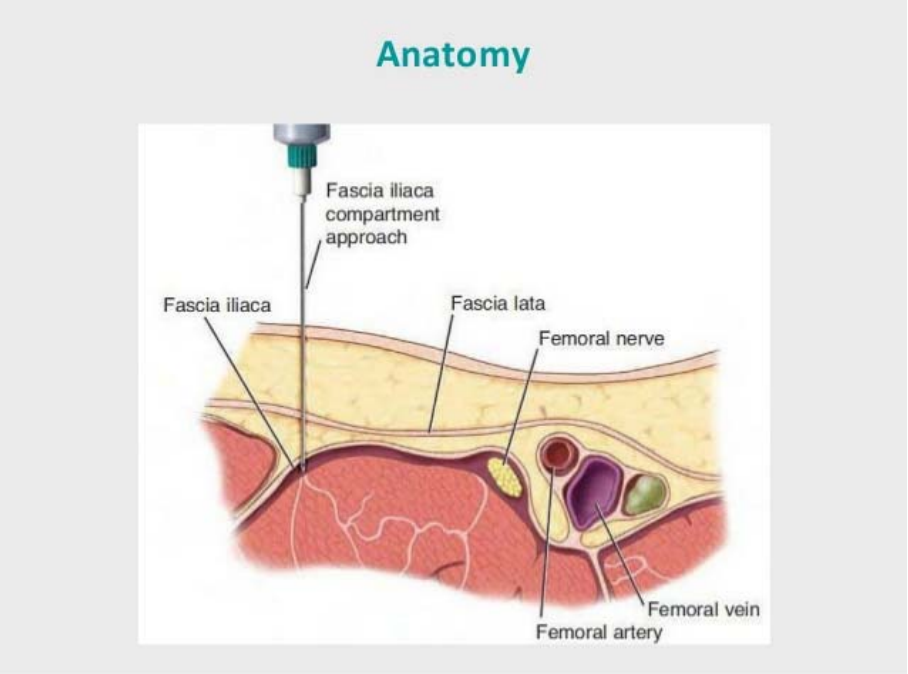

Figure 14: Landmark Technique Of Fascia Iliaca Block

ULTRASOUND GUIDED TECHNIQUE :

The ultrasound guided technique is as same as landmark technique. However, we can visualize the needle placement and local anesthetics delivery confirms depositions of the drug into the correct plane. Linear transducer high frequency probe (6-14MHz) is used.

Patient in supine position, skin is disinfected with povidone solution. Place the transducer at the level of femoral crease and oriented parallel to it.

- First identify femoral artery, iliopsoas, fascia iliaca and then move the transducer laterally until Sartorius muscle is seen
- Make a skin wheel at the point of entry, the needle is inserted “in plane”. As it passes through the fascia iliaca the fascia is seen indented by the needle, while piercing a pop up is felt and fascia snaps back on the usg image.
- To confirm the proper plane (between fascia and iliacus muscle) inject 1-2 ml of local anaesthetics after negative aspiration .Needle repositioning should be done if the drug spreads above the fascia or with in the substance of muscle.
- For a successful blockade 30-40 ml of local anesthetics is required. Drug spread towards the femoral nerve medially & Sartorius muscle laterally.
- In obese patients “out of plane” technique is useful.

HOURGLASS PATTERN IN USG[25]

Place the transducer at Anterior superior illiac spine pointed midway between umbilicus and xiphisternum sliding the probe medially along the inguinal ligament, identify the hourglass pattern which is formed by Sartorius, internal oblique, iliacus muscle. Muscle underlying this hourglass pattern is iliacus & fascia iliaca overlies it. In case of In plane technique insert the needle through the Sartorius muscle till it pierces fascia iliaca where a popup is felt. After negative aspiration inject 1-2ml of drug/saline which forms a lens of local anesthetics further injection, selfing of muscle from its fascia called as hydro dissection occurs. Drug will spread along the plane as soon as it is injected.

Figure 15: Fascia Iliaca Compartment Block (Needle in Situ)

BUPIVACAINE PHARMACOLOGY[26,27]

Structure

Bupivacaine Hydrochloride is 2-Piperidinecarboxamide, 1-butyl-N-(2, 6-dimethylphenyl)-, monohydrochloride, monohydrate.

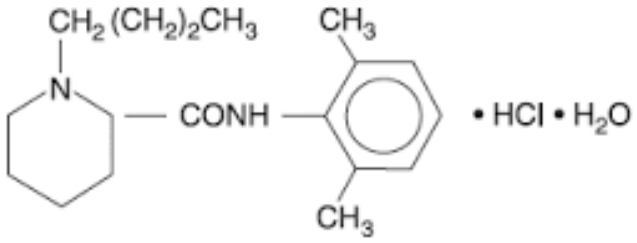

Figure 16. Chemical Structure of Bupivacaine

It is an amide local anaesthetic characterized as pipecoloxylidides. Addition of a butyl group to the piperidine nitrogen of mepivacaine results in bupivacaine. It is a chiral drug , because of possession of asymmetric carbon atom. It is available as racemic mixture, containing equal proportions of the S and R enantiomers.

Its was first synthesized in Sweden by Ekenstam and his colleagues in 1957 and used clinically by L.J. Telivuo in 1963.

Mechanism of action

Local anaesthetics bind to the alpha subunit of voltage gated Na+ channels. It prevents transmission of nerve impulses by inhibiting passage of sodium ions through ion selective sodium channels in nerve membranes.They do not alter the transmembrane potential or threshold potential.

Pharmacokinetics

Its is a weak base that has pKa value above physiologic pH 7.4 . Lung is capable of extracting bupivacaine from circulation. This extraction limits the concentration of drug reaching the sytemic circulation for distribution to the coronary and cerebral circulations. This first pass pulmonary extraction is dose dependent, suggesting that the uptake process becomes saturated rapidly. Alpha 1 glycoprotein is the plasma protein binding site of bupivacaine.

Molecular weight (base)	:	288
Pka	:	8.1
Protein binding	:	95 %
Lipid solubility	:	28
Volume of distribution	:	73 litre
Clearance of drug from plasma	:	0.417 lit / min
Elimination half life	:	210min

Distribution

Three-compartment open model:

* The first compartment is represented by the rapid intravascular distribution of the drug.

* The second compartment represents the equilibration of the drug throughout the highly perfused organs such as the brain, myocardium, lungs, kidneys, and liver.

* The third compartment represents an equilibration of the drug with poorly perfused tissues, such as muscle and fat.

Metabolism and Elimination

After administration in man, peak levels of Bupivacaine in the blood are reached in 30 to 45 minutes, followed by a decline to insignificant levels during the next three to six hours. The half-life of Bupivacaine Hydrochloride in adults is 2.7 hours and in neonates 8.1 hours.

Undergoes varying rate of metabolism by microsomal enzymes located primarily in the liver. Bupivacaine has the slowest metabolism among amide local anaesthetics, it undergoes aromatic hydroxylation, N – dealkylation, amide hydrolysis and conjugation . Only the N – desbutyl bupivacaine has been measured in blood or urine after epidural and spinal anaesthesia. Less then 10% of drug is excreted unchanged in urine. The onset of action after a peripheral nerve block is usually 20-30mins and lasts for 8 to 9 hours.

Preparations and Usage

- 0.25%, 0.5% in 10ml and 20ml vials- for infiltration , epidural ,peripheral nerve block. Maximum permitted dose 3mg /kg
- 0.5% bupivacaine + 80mg dextrose in 4ml ampoules– for intrathecal injections. Maximum dose 20mg.

Contraindications

Known hypersensitivity to local anesthetics
Intravenous regional anaesthesia
Para cervical block

SIDE EFFECTS

The rate of systemic absorption of local anesthetics is dependent

* Upon the total dose injected
* Concentration of drug administered,
* The route of administration,
* The vascularity of the administration site,

Cardiovascular Effects

Bupivacaine is more cardio toxic than equieffective doses of lignocaine. Accidental intravenous injection of bupivacaine causes severe ventricular arrhythmias and myocardial depression. Bupivacaine blocks cardiac Na +

channels rapidly during systole and dissociates slowly during diastole, so that significant fraction of Na channels remain blocked at the end of the diastole. Thus the block by Bupivacaine is cumulative and substantially greater. Plasma concentrations of bupivacaine to produce cardiotoxicity is 8-10mic/ml.

IV lipid emulsion has been used in the treatment of cardiotoxicity induced by bupivacaine along with cardio pulmonary resusitation.20% lipid bolus is administrated at a dose of 1.5ml/kg over 1 minute ,can be repeated every 3 to 5 minutes. Followed by infusion of 0.25ml/kg/m. maximum dose of 8ml/kg is recommended.

Central Nervous System Effects

Central nervous system stimulation and depression are produced. Apparent central stimulation is manifested as restlessness, tremors and shivering progressing to convulsions, followed by depression and coma progressing ultimately to respiratory arrest. A primary depressant effect may occur on the medulla and on higher centers , this may occur without prior excited state.

CNS toxicity is treated by adequate ventilation and oxygenation and by anticonvulsants. Thiopentone (1 to 2ml /kg) may be used in refractory seizures.

MATERIALS AND METHODS

This study was conducted at Government Stanley Medical College hospital, Chennai on 120 patients who underwent elective surgery for femur surgery. This study was conducted after obtaining approval from the institutional ethical committee. Patients were explained about the procedure in detail and informed written consent was obtained for the same.

Study Design

This study is a randomized prospective interventional clinical trial. Randomization was done by allocating the patients to either the Fascia iliaca group (Group F) or Epidural group (Group E) by draw of lots. Study was a double blinded study. The patients who met the inclusion and exclusion criteria were only included in the study. Patients were divided into 2 groups of 60 each.

Group F : Patients receiving fascia iliaca compartment block (FICB)

Group E : Patients receiving epidural block.

Sample Size

Sample size required for the study

za	**Zb**	p1	q1	p2	q2
1.645	0.842	0.78	0.22	0.63	0.37

p1*q1	p2*q2	p2-p1	(p2-p1)^2	p1q1+p2q2	(Za+Zb)^2	Sample size
0.172	0.233	-0.15	0.0225	0.4047	6.1852	111.3

In the published paper reference the success rate observed for epidural procedure is 78% and for FICB catheter procedure is 63%. Based on these proportion for these two groups and assuming the significance level of 5% with power of 80% the required sample size for the study is 112. i.e for each group 56 cases is needed .

Za = Type I error i.e significance level taken as 5% 1- tail test value 1.645

Zb = Type II error i.e Power of the test taken as 80% - value 0.842.

P1 = The proportion of success in Epidural group = 0.78 i.e 78%

q1 = The proportion of failure in Epidural group = 0.22 i.e 22%

P2 = The proportion of success in FICB catheter group = 0.63 i.e 63%

q2 = The proportion of success in FICB catheter group = 0.37 i.e 37%

Sample size = $2(1.645 +0.842)^2 (78*22 + 63*37)/ (78-63)^2$

= 111.3 i.e 112.

Inclusion Criteria

- Patients between the ages 18-60 years
- Both gender
- ASA-PS I, ASA-PS II;
- Weight 50-80kg,
- Undergoing elective surgery (fracture femur surgery includes neck of femur, total/hemi hip replacement, proximal femur) under spinal anaesthesia**.**

Exclusion Criteria

- Patient refusal
- Coagulopathy
- Drug allergy
- Skin lesions at the side of the blocks
- Chronic Pain
- Previous femoral bypass surgery

Materials Required

- Monitor – NIBP ,ECG, Pulse oximeter
- Resuscitation equipments and drugs
- Antiseptic skin preparation and sterile gloves
- Ultrasound machine with high frequency linear probe
- 17 G epidural tuohy needle set
- 25 G quinckes spinal needle

- Drugs
    - inj midazolam ,
    - Inj .bupivacaine 0.5%
    - Inj .bupivacaine 0.5% hyperbaric
    - Inj.tramadol
    - Inj. Ondansetron

Study Method

Procedure

After approval from the ethical committee and written informed consent, n=120 patient were selected for the study based on the inclusion and exclusion criteria. Written informed consent was obtained from the patient the day before surgery. Using computerized randomized selection, patients were assigned into two groups-Epidural group (group E) and Fascia iliaca group (group F).

On the day of surgery, patients were shifted to pre-medication room started with 18G iv cannula.

Standard Monitors – NIBP, pulse oximeter, ECG are attached. Patient in both groups were premedicated with 0.05 mg/kg of midazolam.

Patients from both the groups underwent fracture femur surgery, under spinal anaesthesia with 3.5 ml 0.5% Bupivacaine(heavy).

Group E patients received epidural catheter at the time of spinal anesthesia preoperatively . Group F patients received fascia iliaca catheter at the end of procedure.

Group E

Patient was placed in sitting position . The back was prepared with povidone solution and sterile drapes applied. 2ml of 2% Lignocaine was used for local infiltration at space L3- L4 space.The approach used for epidural technique was midline approach. Technique chosen for identification of epidural space was loss of resistance technique using a air filled syringe , using the Bromage grip.

18 G Tuohy needle was inserted at L3 –L4 interspace and epidural space is identified at 3.5-5 cm from skin level by LOR Technique. An Epidural catheter was threaded into the epidural space via the epidural needle and catheter was fixed so that 5 cm of the catheter was in epidural space .

After negative aspiration test dose is given with 3ml of 1.5% Lignocaine with 15microg adrenaline.

Then patients was given spinal anaesthesia with 0.5% hyperbaric Bupivacaine 3.5ml at L4-L5 space using 25G quinckes needle after local infiltration with 2% lignocaine.

Group F

Group F patients were given spinal anesthesia with 3.5 ml of injection 0.5% hyperbaric bupivacaine at L4-L5 interspace using 25G Quinckes needle . At the end of the procedure patient received Ultrasound guided Fascia iliaca compartment block.

Patient was placed in the supine position. After preparation of the skin with povidone solution, a sterile high frequency USG probe(8-12Mhz) is placed at anterior superior iliac spine pointed midway between umbilicus and xiphisternum. Then slide the probe medially along the inguinal ligament to get hourglass pattern.

Then the epidural needle is inserted through the Sartorius muscle in a In Plane approach after a skin wheel is made .Needle entry point was 3-4cm from the edge of the transducer. This allows for a decreased needle angle trajectory to fascial plane ,which optimizes the angle of incidence of the ultrasound beam relative to the needle. Then the needle is advanced until we feel the pops as we pierced fascia iliaca.

Once the needle enters the fascia iliaca compartment, 4-5ml of 0.9% normal saline is injected to confirm the correct needle placement. Optimal needle location is indicated by the appearance of an anechoeic fluid collection separating the fascia iliaca from iliacus muscle and visibly expands the compartment, usually reached at an average depth of 4-6cm from skin level.

The epidural catheter is introduced 4-6cm beyond the tip of needle into the compartment. The correct location of catheter tip may be confirmed by either direct visualization via usg or local anaethetics accumulation in fascia iliaca compartment. 20 ml of 0.125% bupivacaine injected via the catheter the local anaethetics is injected the fascial compartment expands due to hydrodissection. This will result in separation of fascia from iliacus muscle.

In the recovery room both Group F and Group E was started continuous infusion via catheter at the rate of 8ml/hr for 24 hours .

Outcomes Measured

The primary outcome

Assessment of postoperative pain by Visual Analogue scale (VAS score)

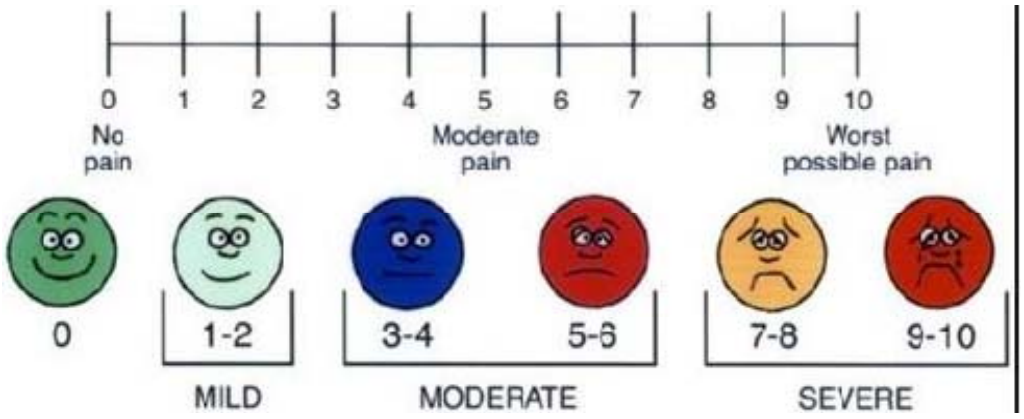

Figure 17. Visual Analogue Score

Secondary Outcome measures:

- **Requirement of rescue analgesia**: if the post operative pain score as measures by visual analogue scale is > 3 then rescue analgesia will be given with iv tramadol 100mg
- **Postop nausea and vomiting** :Patients were assessed for nausea by nausea scores

  None-0

  Mild-1

  Moderate-2

  Vomiting-3

Rescue antiemetics were given to patients wih nausea score greater then or equal to 2 with inj ondansetron 4mg

- **Patient Satisfaction**:

Patient satisfaction were assessed based on their postoperative analgesia at the end of 24 hours

1 – not satisfying

2 - satisfying

3 – very satisfying

- **Therapeutic failure** is defined as inadequate pain relief from surgical wound and drains.

- Technical Failure is the inability to insert catheter as a result of poor tissue planes.

- Hypotension was defined as fall in systolic blood pressure to more then 20% of the baseline value.

- Bradycardia is defined as decrease in pulse rate to more then 20% of the base line value.

All parameters measured at 1hour ,2,4,8,12,16,and 24 th hour

FLOW CHART OF EVENTS

- Written informed consent and explanation of procedure to patient
- Patient shifted to premedication room
- Monitors connected (NIBP,ecg,SpO2)
- 18G IV line secured.
- Ringer Lactate infusion started
- 0.05mg/kg Midazolam given for premedication
- Patient positioned – sitting position
- prepared with Betadine and draped
- Epidural space identified by LOR technique and catheter fixed at L3-L4 level in Group E patients. Test dose 1.5% lignocaine with 15µg adrenaline 1:200000 given.
- Spinal anesthesia using 25G Quinckes needle at L4-L5 interspace with 3.5 ml of inj 0.5% bupivacaine heavy injected into subarachnoid space in both groups Intraop vitals monitored.
- At the end of surgical procedure in group F patients fascia iliaca block performed using 6-12 MHz usg transducer catheter introduced after confirmation of fascial plane 20ml of 0.125% bupivacaine given and confirmation of drug spread .

- Patients from group F received 0.125% bupivacaine 8ml/hr via catheter continuously for 24 hrs
- Patients from group E receive 0.125% bupivacaine 8ml/hr via epidural catheter continuously for 24hrs
- Primary outcome measured will be numerical rating pain scores/VAS scores on a 0-10 cm scale. Scores measured at 1,4.8,12,16,24 hr after surgery.
- Post operative mean arterial pressure ,heart rate monitored at 1,4,8,12,16,24h
- Patients will be monitored for side effects of the procedure and also technical / therapeutic failure.
- In case of failure(Technical/Therapeutic), rescue analgesia is with injection Tramadol 100 mg IV.
- Hypotension will be treated with iv fluids and Inj .ephedrine
- In case of bradycardia –inj atropine
- Urinary retention –Foley catheter insertion
- Nausea vomiting –inj ondansetron

REVIEW OF LITERATURE

1. Diakomion et al [28]:

Following hip fractures, positioning the patient for spinal anesthesia is extremely painful. The Author has conducted a prospective randomized comparative study to evaluate the analgesic efficacy of fascia iliaca compartment block (FICB) versus Intra venous fentanyl consumption to position the patient with hip fractures for sub arachnoid block(SAB)

41 patients were included in this study, randomized into two groups . one group received iv fentanyl (1.5mic/kg) 5min before SAB, other group received FICB (40ml of 0.5%Ropivacaine) 20min before the procedure.

Numerical rating pain score before and after placement of analgesia, time needed and quality of position to perform spinal anaesthesia, post operative analgesia in view of time to iv morphine requirement & total dose over 24 hrs and patient satisfaction were studied.

FICB group had lower numerical rating pain score ($p<0.001$), spinal performance time was shorter ($p=0.001$), quality of position was better ($p=0.001$), the time to first dose of morphine demand was longer ($p=0.001$) & patient satisfaction was good ($p<0.001$).

It was concluded from the study that FICB provides superior pain relief when compared to IV fentenyl for positioning the patient for SAB.

2. Gallardo j et al[29]:

The Author has compared the analgesic efficacy of continuous FICB with continuous epidural in patients posted for knee arthroplasty done under SAB. A sum of 40 patients assessed under ASA PS 1-3 were randomized into two groups .

One group was given SAB plus FICB at a rate of 10ml/hr 0.1% Bupivacaine. Other group received SAB plus epidural infusion @8ml/hr 0.1%bupivacaine.

Postoperative pain was assessed by Visual Analogue Scale (VAS) at rest and on movement for 24hours. Total IV morphine usage and adverse effects were noted.

Postoperative VAS scores were similar in both groups. In epidural group incidence of arterial hypotension was higher.

3. Capdevila x et al [30]:

This study was conducted in 100 adult patients undergoing lower limb surgeries to compare two anterior approaches of Lumbar plexus block namely Three in One (3 in 1) nerve block & fascia iliaca compartment block (FICB)

Effectiveness of technique is analyzed by simultaneous blockade of femoral, obturator, lateral femoral cutaneous nerve & visualization of drug spread by imaging studies.

Both groups were given 30ml of local anesthetic mixture (2% lignocaine with 1:200,000 adrenaline + 0.5% Bupivacaine) & 5ml of contrast media Ioponidol.

The authors have concluded effective postoperative analgesia provided by both the groups. FICB produces faster and more consistent blockade of both FN & LFCN by means of drug spread under fascia iliaca, rarely to lumbar plexus.

4. Shankes et al[31]:

In pediatric patients, harvesting graft for post burn reconstructive surgeries is more painful. In this study the author has evaluated the analgesic efficacy of local anaesthetic infiltration versus ultrasound guided single shot LFCN block and continuous catheter placement FICB.

VAS score was monitored for 48 hours. Patients in the regional blocks were more comfortable, that too with continuous catheter experienced more pain relief till second postoperative day.

5. Mcrae pj et al [32]:

FICB is the one block simple, easy to learn, effective to give pain relief for femur fracture. Femoral fractures are extremely painful, shifting the patient to the hospital makes the pain worsen. Usually they have been given parenteral opioids for pain relief.

In this study author has examined the feasibility and efficacy of FICB done by paramedics in the prehospital setting. It was a randomized study in which one group received FICB (lidocaine with epinephrine), other group received iv morphine only. Pain relief was evaluated by 11 point NRS prior and 15 minutes after the procedure. Secondary outcomes such as effectiveness and adverse effects were also noted.

Patients in FICB group had better reduction in their median pain score p-0.025) than control group,and no obvious adverse effects were noted.

It was concluded that paramedics can easily perform FICB for patient with suspected femoral fractures in the prehospital settings.

6. Dolen j et al[33]:

They have conducted a study to compare the efficacy of fascia iliaca block done by ultrasound guidance versus conventional loss of resistance technique. 80 patients who underwent hip/knee replacement surgery received either ultrasound guided FICB or by conventional method.

Before performing block sensation in the various part of the thigh supplied by femoral nerve, lateral cutaneous nerve of thigh, obturator Nerve were assessed. Motor blockade was assessed by knee extension and hip adduction. Sensory and motor blockade were reassessed after the procedure.

Under usg guidance sensory loss in the medial compartment of thigh increased from 60% to 95% (p=0.001) which was statistically significant. Complete loss of sensation in all compartment is increased from 47% to 82%. Incidence of motor blockade observed was femoral (p=0.006) and obturator (p=0.033)

It was concluded from the study that Ultrasound guided FIB is efficient than conventional technique.

7. Tran dq et al[34]:

Based on EMBASE (jan 1980-april 2007) and MEDLINE (jan 1966-april 2007) database, they summarized evidence regarding techniques and approaches for lower limb nerve block from various randomized controlled trials.

From which they concluded that, in Lumbar plexus block posterior approach (psoas compartment block) is more superior to block obturator nerve than anterior 3 in 1 approach.

FICB is the easiest to perform, and time taken for the procedure is short, cost effective and it can be a better alternative to 3in 1 nerve block.

8. Swenson jd et al[35]:

In this study the author has examined the pattern of distribution of local anesthetics deposited deep to the fascia iliaca, done at the level of inguinal ligament.

Included ten patients (ASA 1,2) undergoing anterior cruciate ligament reconstruction surgery. These patients received either 3in 1block or FICB under ultrasound guidance.

All three nerves (femoral ,lateral femoral cut nerve & obturator nerve) were examined for motor and sensory loss. Distribution pattern is examined by subjecting the patient to MRI imaging.

Drug reached upto the level of retroperitonium superiorly, laterally towards anterior superior iliac spine, medially upto femoral vein, not to the obturator nerve.

All patients had sensory loss over anterior, medial, lateral thigh and extensor muscle weakness. But none of the patients showed motor blockade in obturator nerve(hip adduction)

9. Kaloul et al[36]:

Compared the analgesic efficacy of psoas compartment block with femoral 3in 1 nerve block. Patients undergoing TKR randomly divided into three groups. One group received iv patient controlled morphine analgesia

(PCA) acting as a control, others received PCA + continuous FEM block and PCA+ continuous PSOAS block and both groups were given bolus dose of 0.5%Ropivacaine 30ml with adrenaline and maintenance @ 12ml /hr 0.2% Ropivacaine for 48hours.

Patients were monitored for VAS score, total morphine consumption, sensory and motor blockade.

Both block groups showed low pain score ($p<0.0001$) and morphine consumption (FEM 37.3+/-34.7mg $p=0.0002$ & PSOAS 36.1+/-25.8mg $P<0.0001$) than PCA(72.2+/-26.6 mg)

Though PSOAS group showed consistant blockade of obturator nerve ($p<0.0001$) than FEM , there was no difference in pain scores and morphine consumption.

OBSERVATIONS & RESULTS

A randomized controlled double blinded study was conducted to compare the analgesic efficacy of continuous epidural analgesia with ultrasound guided continuous Fascia iliaca compartment block following fracture femur surgery. Sample size selected was 120 patients. The 120 patients were randomly allocated into Group E (epidural) and Group F (fascia iliaca) by computerized randomization. After collecting the data, all the variables are examined for outliers and non-normal distributions. The Categorical variables are expressed as Frequency and Percentage. The Quantity variables are expressed as mean and standard deviation. Descriptive statistics are used to evaluate baseline characteristics.

Student's *t*-test was used to analyze the parametric data, and discrete (categorical) variables were analyzed using the Chi-Square test, with a $P < 0.05$ considered statistically significant.

The statistical analysis was carried out using statistical software package SPSS 20.0.

DEMOGRAPHIC PROFILE

Table 3: AGE DISTRIBUTION

AGE IN YEARS	GROUP E	GROUP F	P VALUE
Mean ± SD	42.27± 15.5	47.1 ±13.35	0.069

Mean age in group E was 42.27 years and the standard deviation was 15.5 years. Mean age in group F was 47.1 years and the standard deviation was 13.3 These data were computed using students t-test and the P value was found to be 0.069. This difference is considered to be not statistically significant.

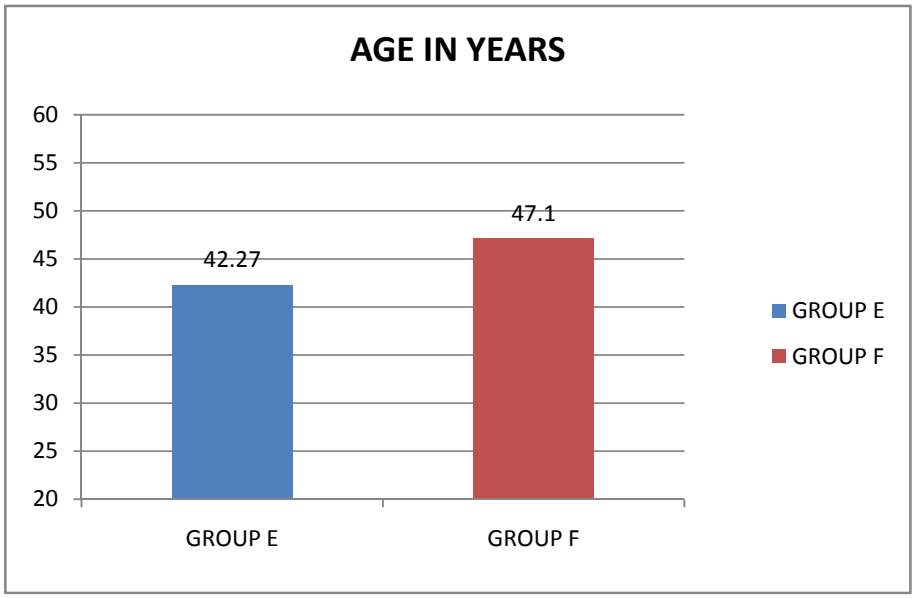

Figure 18. AGE DISTRIBUTION

SEX DISTRIBUTION

The number of male patients in Group F were 42, where as the number of female patients were 18. The number of male patients in Group E were 47, whereas the female patients were 13 in numbers. The data was computed using chi-square test. The two tailed P-value equals 0.297, which is not statistically significant.

Table 4: SEX DISTRIBUTION

SEX	GROUP E	GROUP F	P VALUE
MALE	47	42	0.297
FEMALE	13	18	

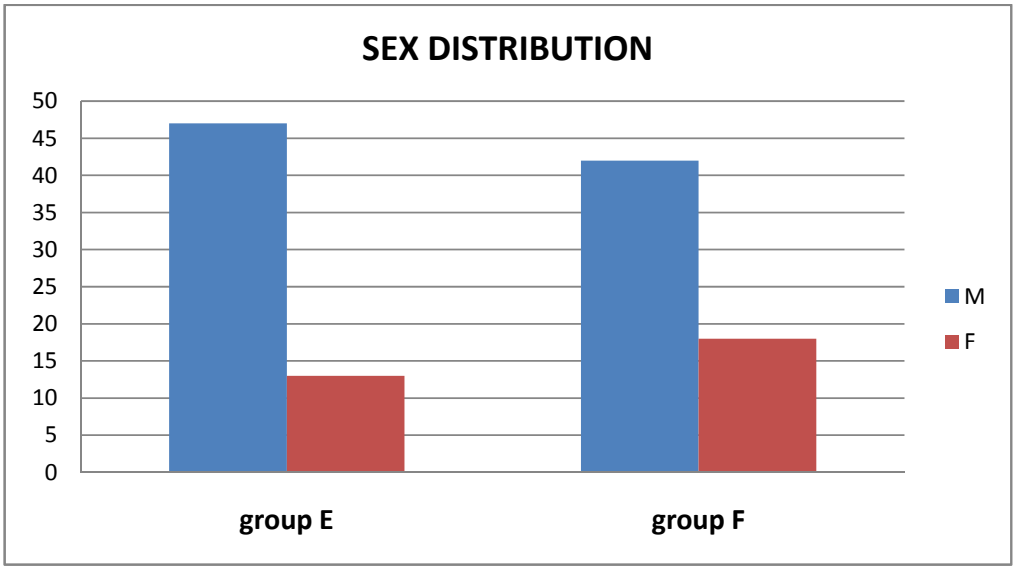

Figure 19: Sex Distribution

WEIGHT DISTRIBUTION

Mean weight in Group F was 66 kg with a standard deviation of 7.55kg, m. Mean weight in Group E was 66kg with a standard deviation of 8.52kg. Data was computed using students t-test. The two failed P-value equals 0.821, which is not statistically significant.

Table 5 :WEIGHT DISTRIBUTION

WEIGHT IN KG	GROUP E	GROUP F	P VALUE
Mean ± SD	66.48 ± 8.52	66.15 ± 7.55	0.821

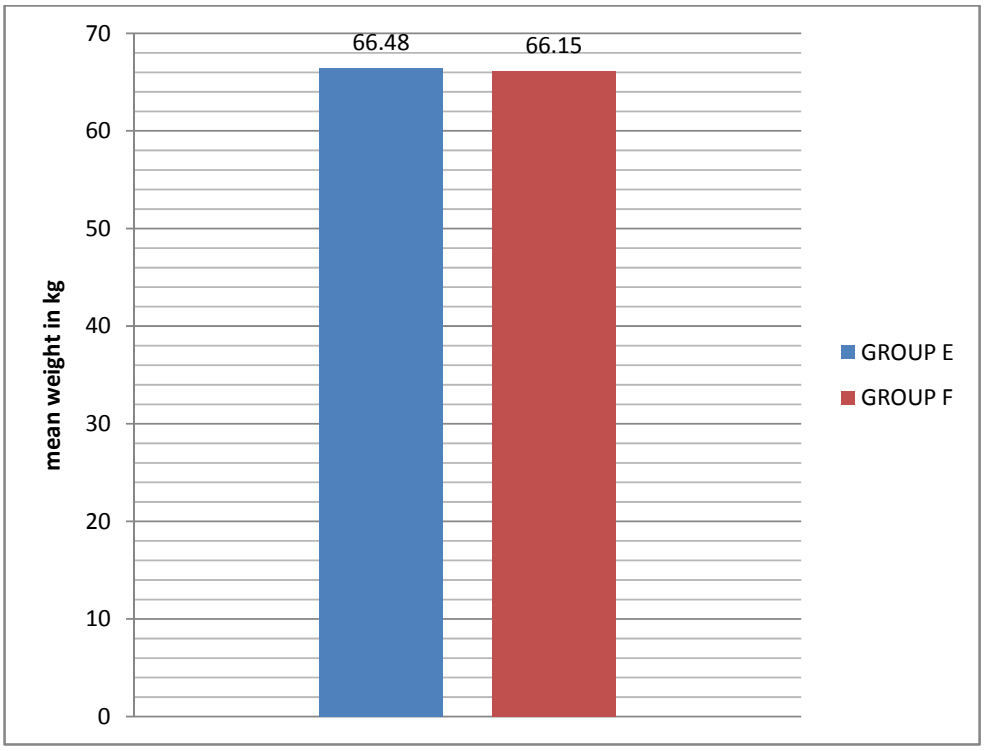

Figure 20: Weight Distribution

HEIGHT DISTRIBUTION

Mean height in Group E 161.45cm with a standard deviation of 2.709cm. The mean height in Group F was 161.9cms with a standard deviation of 2.933cm. The two failed P-value equals 0.384, which is not statistically significant.

Table 6: HEIGHT DISTRIBUTION

HEIGHT IN CM	GROUP E	GROUP F	P VALUE
Mean ± SD	161.45 ± 2.709	161.90 ± 2.933	0.384

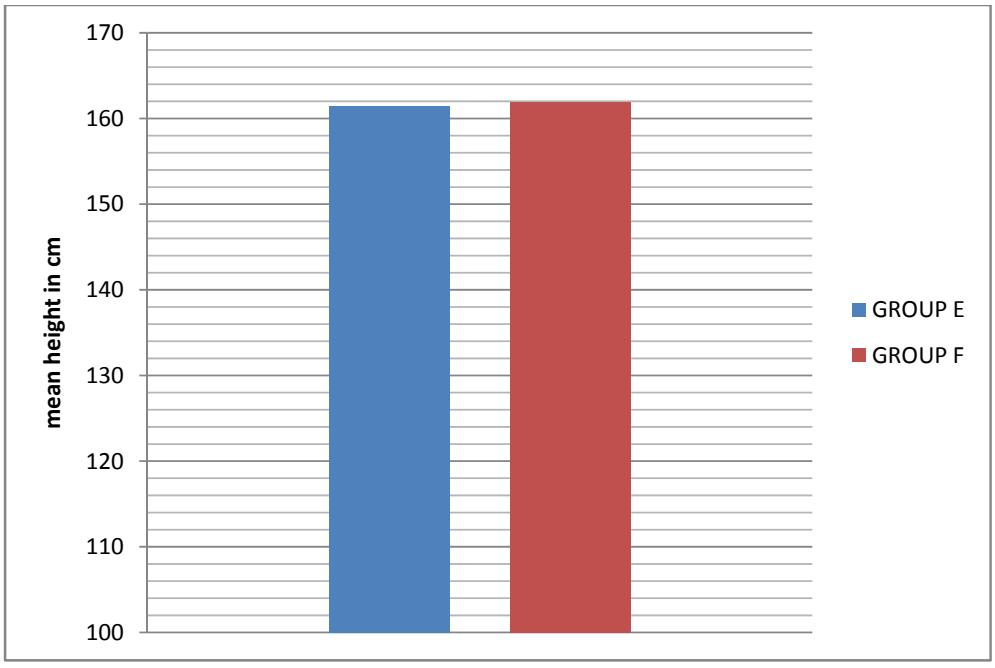

Figure 21: HEIGHT DISTRIBUTION

DISTRIBUTION OF SURGICAL PROCEDURES

Table 7 DISTRIBUTION OF PROCEDURE

Procedure	Group E	Group F
DCS	2	4
Dynamic Hip Screw	10	16
Hemiarthroplasty	8	11
Intramedullary Interlocking Nailing	21	11
Others	3	3
Proximal Femur Nailing	6	4
Total Hip Replacement	10	11
Total	60	60

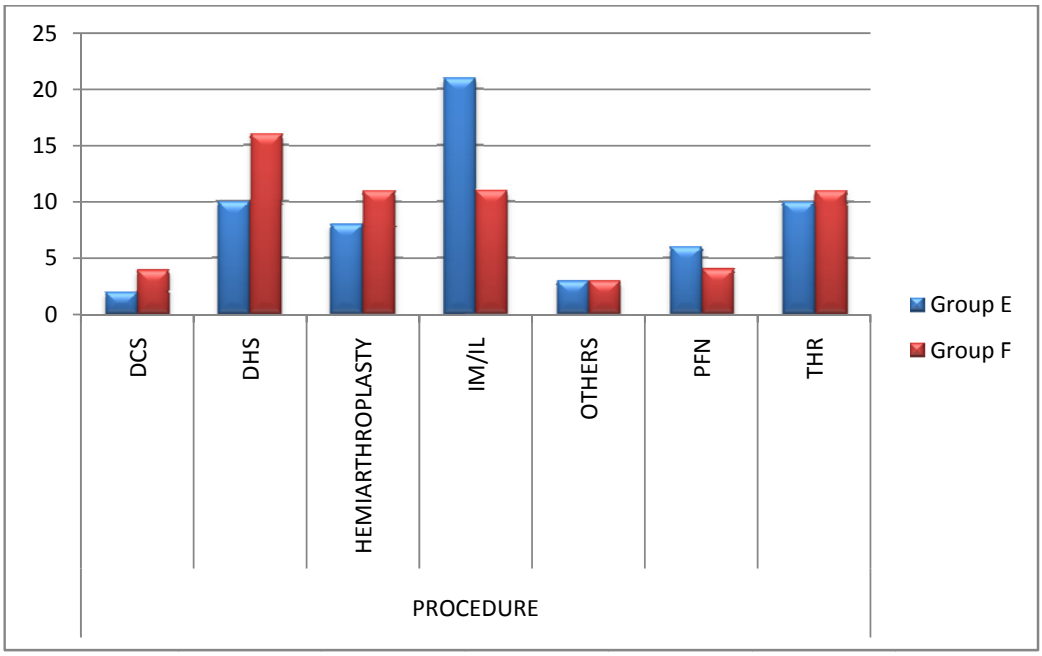

Figure 22 DISTRIBUTION OF PROCEDURES

The diagnosis and nature of surgical procedures are statistically insignificant in both groups. P value is 0.412.

ASA CLASSIFICATION

In Group E, the number of patients assessed under ASA –PS1 were 36 with ASA-PS2 were 24 in number. In Group F, the number of patients assessed under ASA PS 1& 2 were 28 & 32. The p value was computed as 0.143 (Table 6, Figure 6)

Table 8: ASA CLASSIFICATION

	Group E	Percentage	Group F	Percentage
ASA PS 1	36	60%	28	46.7%
ASA PS 2	24	40%	32	53.3%
Total	60	100%	60	100%

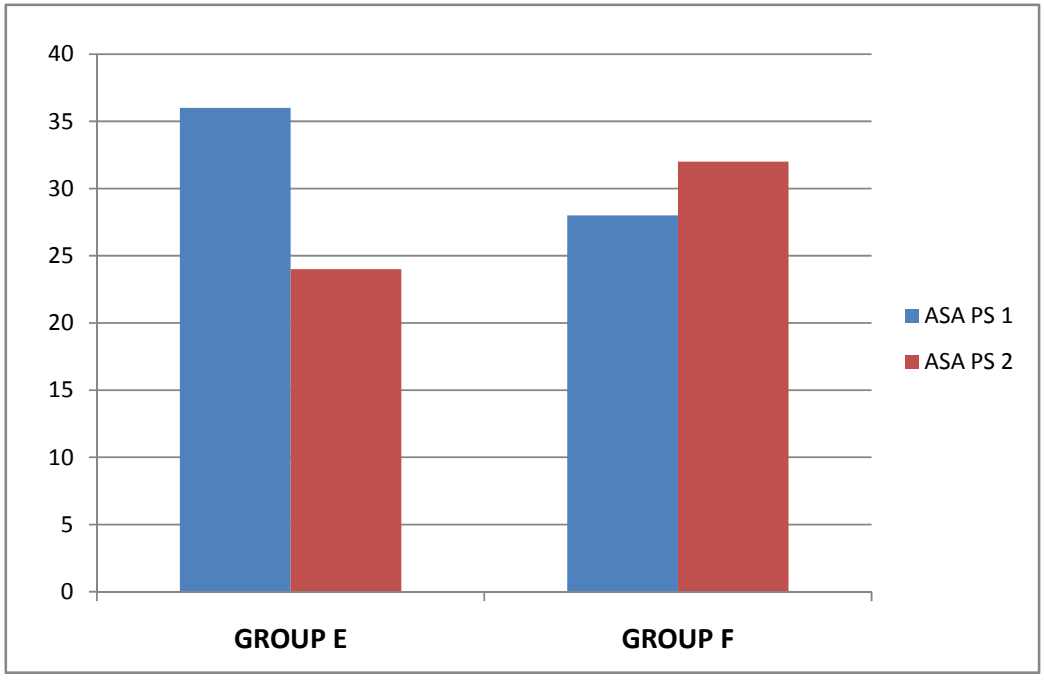

Figure 23:ASA CLASSIFICATION DISTRIBUTION

DURATION OF SURGERY

Table 9:DISTRIBUTION OF DURATION OF SURGERY

DURATION IN MIN	GROUP E	GROUP F	P VALUE
Mean ± SD	112.33 ± 14.42	111.08 ± 14.23	0.634

The average duration of surgery in Group E was 112.33 minutes with a standard deviation of 14.42. The mean duration of surgery in Group F was 111.08minutes with standard deviation of 14.23. p value is 0.634 which is statistically not significant.(figure 7,table 7)

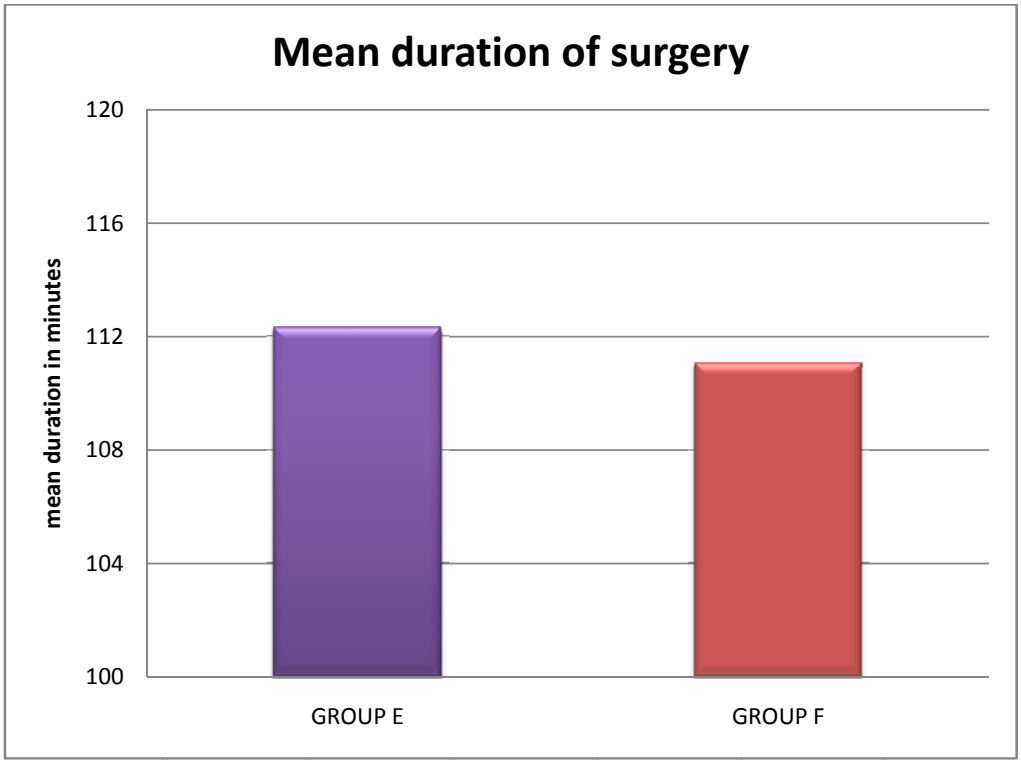

Figure 24: DISTRIBUTION OF MEAN DURATION OF SURGERY

VAS SCORING

Table 10: DISRIBUTION OF MEAN VAS SCORE

TIME (IN HOURS)	GROUP E MEAN ± SD	GROUP F MEAN ± SD	P VALUE
VAS 1	2.28± 0.804	2.43 ± 0.851	0.323
VAS 2	2.88±1.05	2.55± 1.28	0.123
VAS 4	2.47 ± 1.321	2.77 ± 1.332	0.218
VAS 8	2.53 ± 1.268	2.95 ± 1.111	0.058
VAS 12	2.45 ± 1.096	2.90 ± 1.515	0.065
VAS 16	2.45 ± 1.185	2.67 ± 1.410	0.364
VAS 20	2.57 ± 1.212	2.80 ± 1.493	0.349
VAS 24	2.50 ± 1.127	2.87 ± 1.321	0.105

Postoperative pain scores were measured using visual analog scores in a 0-10cm scale. The visual analog scores were compared between the two groups, Group E and Group F VAS scores were measured at 1hour, 2 hours, 4 hours, 8 hours, 12 hours, 16 hours, 20 hours, and 24 hours. The visual analog scores over the entire 24 hour was comparable between the two groups. The average VAS scores are enumerated in table 8 and figure 8.

The p-value between the two groups over the entire 24 hours in the postoperative period was not statistically significant.

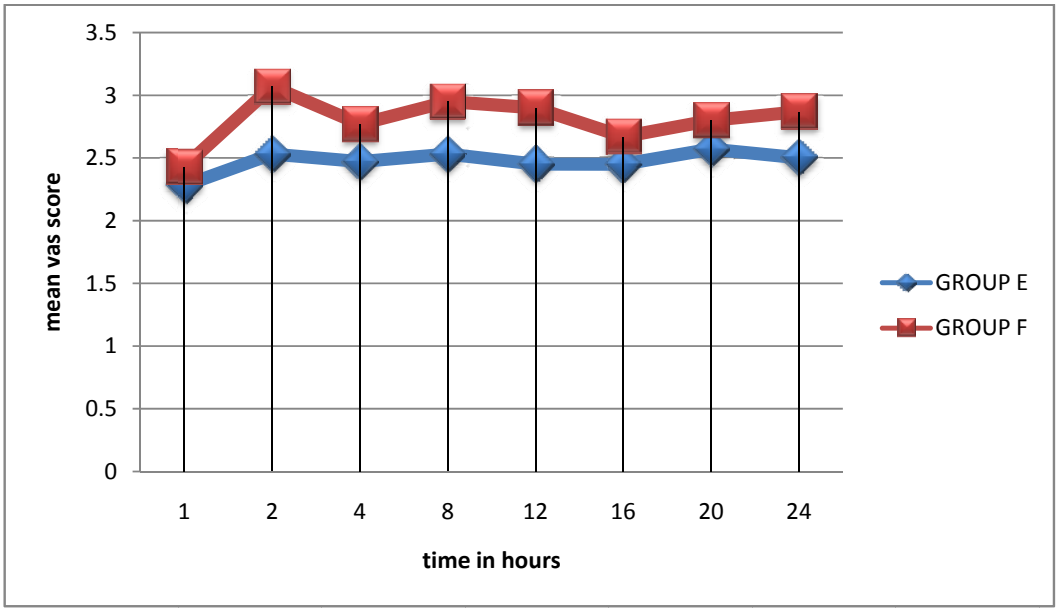

Figure 25: DISTRIBUTION OF MEAN VAS SCORE

PULSE RATE

Table 11: DISTRIBUTION OF MEAN HEART RATE

TIME IN HOURS	GROUP E MEAN ± SD	GROUP F MEAN ± SD	P VALUE
1	74.72 ± 9.908	76 ± 8.084	0.439
2	75.35 ± 9.433	76.47 ± 8.348	0.494
4	75.22 ± 9.386	75.78 ± 8.461	0.729
8	74.48 ± 8.835	76.70 ± 9.303	0.183
12	74.93 ± 9.159	76.92 ± 9.032	0.235
16	76.17 ± 9.636	77.45 ± 8.937	0.451
20	76.12 ± 8.768	77.22 ± 8.842	0.495
24	76.68 ± 9.285	77.83 ± 9.453	0.503

Heart rate was monitored over a period of 24 hour, in the postoperative period in both Group E and Group F, at intervals of 1 hour, 2 hours, 4 hours, 8 hours, 12 hours, 16 hours, 20 hours and 24 hours. The p-value was not significant at all time intervals.

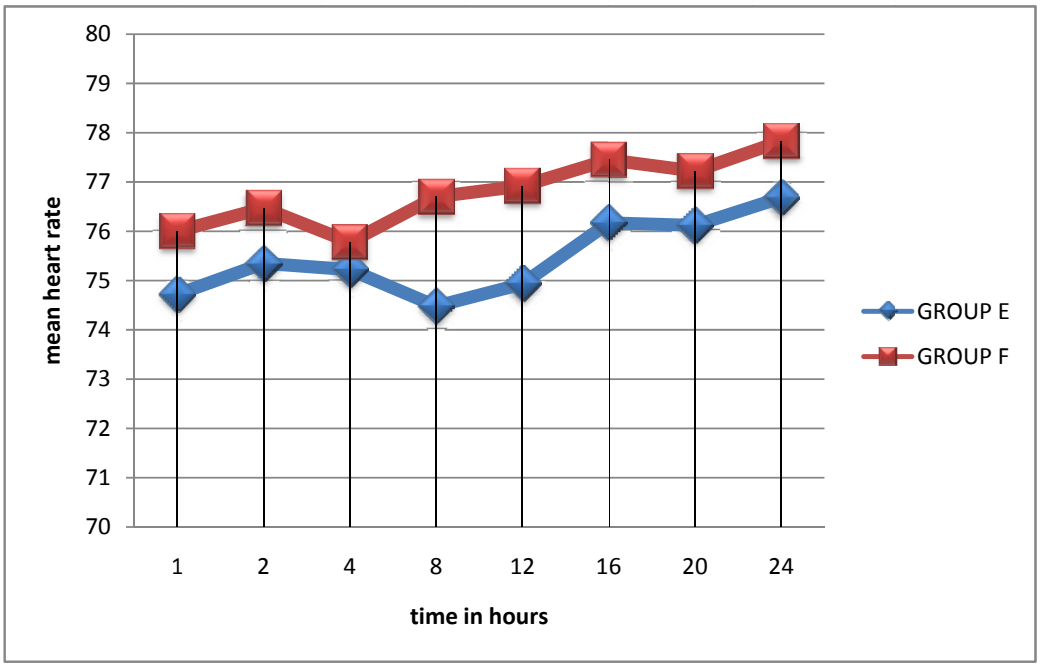

Figure 26:DISTRIBUTION OF HEART RATE

SYSTOLIC BLOOD PRESSURE

Systolic blood pressure measured at 1,2,4,8,12,16,20,24th hourly. P value was found to be statistically not significant.

Table 12. Systolic Blood Pressure

Time in hours	GROUP E	GROUP F	p-value
1	110.42 ±9.91	109.70±11.99	0.772
2	109.22±9.15	108.80±12.62	0.836
4	108.97±9.82	110.68±11.12	0.372
8	109.22±9.22	112.18±10.8	0.109
12	109.13±9.36	111.42±10.3	0.207
16	110.0±9.24	112.17±12	0.278
20	110.35±8.79	113.13±10.8	0.124
24	109.18±15.27	112.72±10.91	0.156

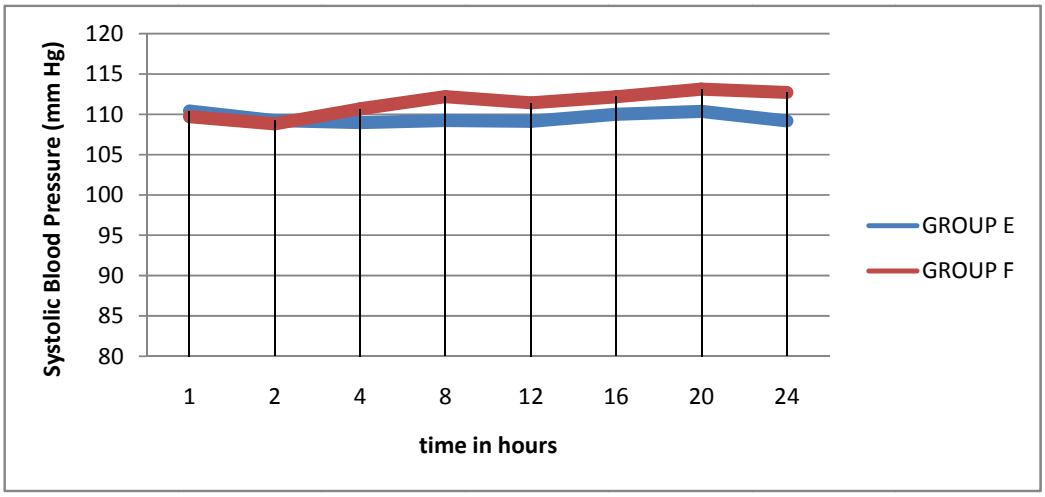

Figure 27 : DISTRIBUTION OF SYSTOLIC BLOOD PRESSURE

DIASTOLIC BLOOD PRESSURE

Table 13. Diastolic Blood Pressure

Time in hours	GROUP E	GROUP F	p-value
1	63.33±6.34	63.05±7.77	0.827
2	63.53±6.78	63.70±7.01	0.890
4	63.57±6.52	63.33±11.95	0.895
8	64.83±6.51	65.67±7.10	0.505
12	63.02±6.56	64.95±11.42	0.258
16	64.5±6.65	65.42±7.68	0.486
20	63.37±6.71	65.45±6.93	0.097
24	65.22±6.55	66.1±6.92	0.472

Diastolic blood pressure was measured over 24 hours postoperative period. P value was found to be statistically not significant.

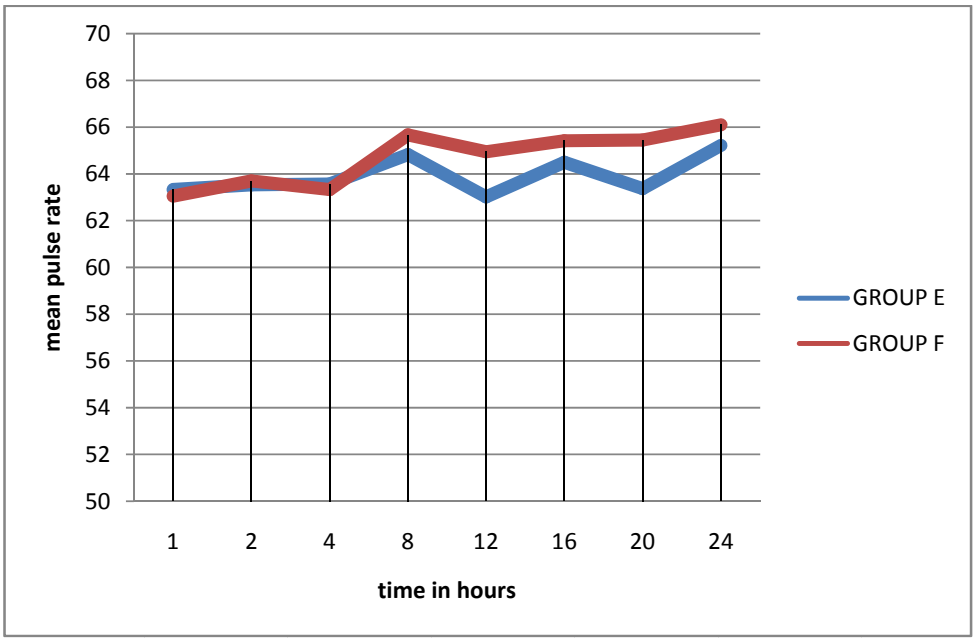

Figure 28 DISTRIBUTION OF DIASTOLIC BLOOD PRESSURE

MEAN ARTERIAL BLOOD PRESSURE

Table 14. Mean Arterial Blood Pressure

Time in hours	GROUP E	GROUP F	p-value
1	79.02±6.86	78.6±8.56	0.763
2	78.76±6.42	78.73±8.13	0.983
4	78.7±6.92	79.11±9.65	0.786
8	79.62±6.62	81.17±7.6	0.238
12	78.38±6.69	80.43±9.36	0.170
16	79.67±6.57	81±8.29	0.335
20	79.02±6.49	81.34±7.19	0.067
24	79.83±8.17	81.63±7.62	0.223

Mean arterial pressure was measured over the entire 24 hours postoperative period at specified time intervals. P value was found to be statistically not significant, at all time intervals.

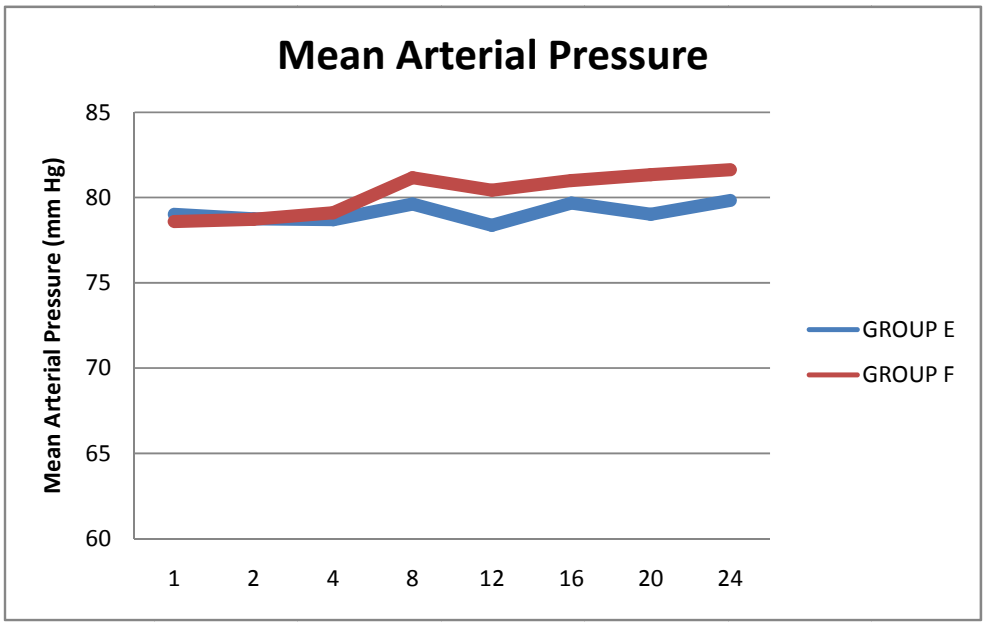

Figure 29 Mean arterial pressure

POSTOPERATIVE NAUSEA AND VOMITING

Table 15. Postoperative Nausea and Vomiting

PONV	GROUP E	GROUP F
0	23	29
1	25	25
2	6	4
3	6	2
P value 0.378		

Postoperative nausea and vomitting scores were measured over the 24hours. The scores were : No nausea = 0, moderate nausea = 2, vomiting = 3. Rescue antiemetics were given if nausea score ≥ 2. Nausea score was 4 in 19 patients in group F.Vomitting was present in 2 patients in Group T. Nausea score was 2 in 6 patients in Group E. 6 patient had vomiting in Group E.

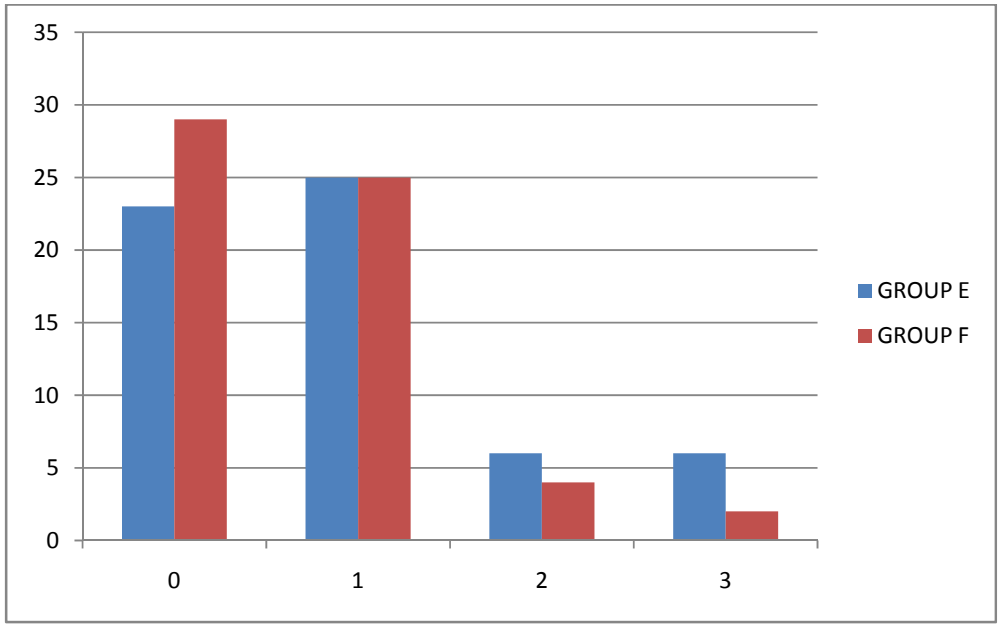

Figure 30. Postoperative Nausea and vomiting

RESCUE ANALGESIC REQUIREMENT

Rescue analgesics were provided when Visual Analogue Score(VAS) scores ≥ 4, or on patient demand. Out of 60 patients in Group F, 12 of them required rescue analgesics, and in Group E also 12 patients required rescue analgesics.

P value- 0.171

Table 16. Rescue Analgesia

	GROUP E	GROUP F
NO	51	45
YES	9	15

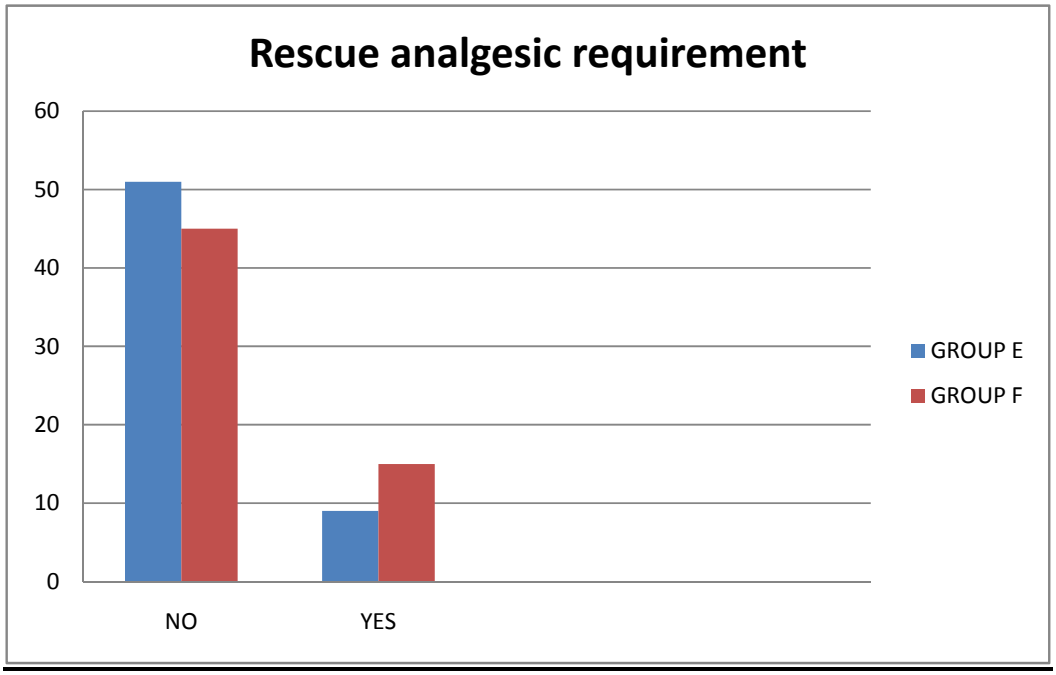

Figure 31. Rescue Analgesic requirement

URINARY RETENTION

Table 17. Urinary Retention

URINARY RETENTION	GROUP E	GROUP F	P VALUE
NO	51	58	0.027
YES	9	2	

9 patients had urinary retention in Group E but 2 patients only in group F. p value is 0.027 that is statistically significant.

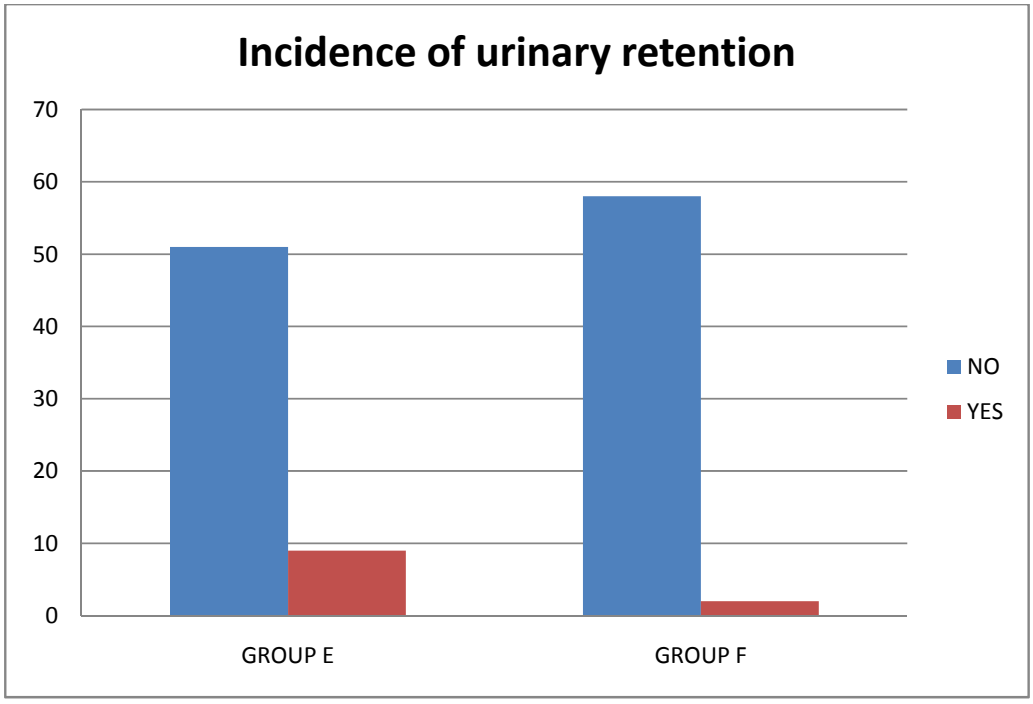

Figure 32. Incidence of urinary retention

PATIENT SATISFACTION

Table 18. Patient Satisfaction

PATIENT SATISFACTION	GROUP E	GROUP F	PVALUE
1	8	11	0.509
2	23	26	
3	29	23	

Patient satisfaction score were 1- not satisfying , 2- satisfying, 3- very satisfying. In group E 29 patients and group F 23 patients had score 3 that is comparable. P value is 0.509 , not statistically significant.

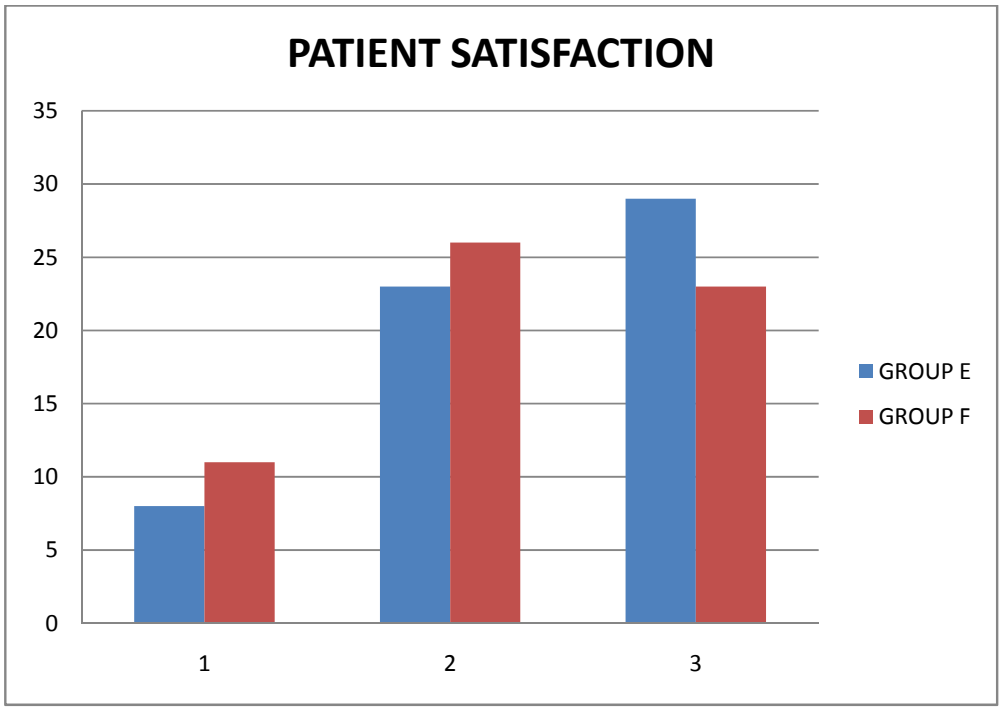

Figure 33. Patient satisfaction

THERAPEUTIC FAILURE

Table 19. Failure

THERAPUETIC FAILURE	GROUP E	GROUP F	P VALUE
0	56	52	0.224
1	4	8	

In epidural group 4 patients and in FICB group had 8 patients had failure. P value is 0.224. That is not statistically significant.

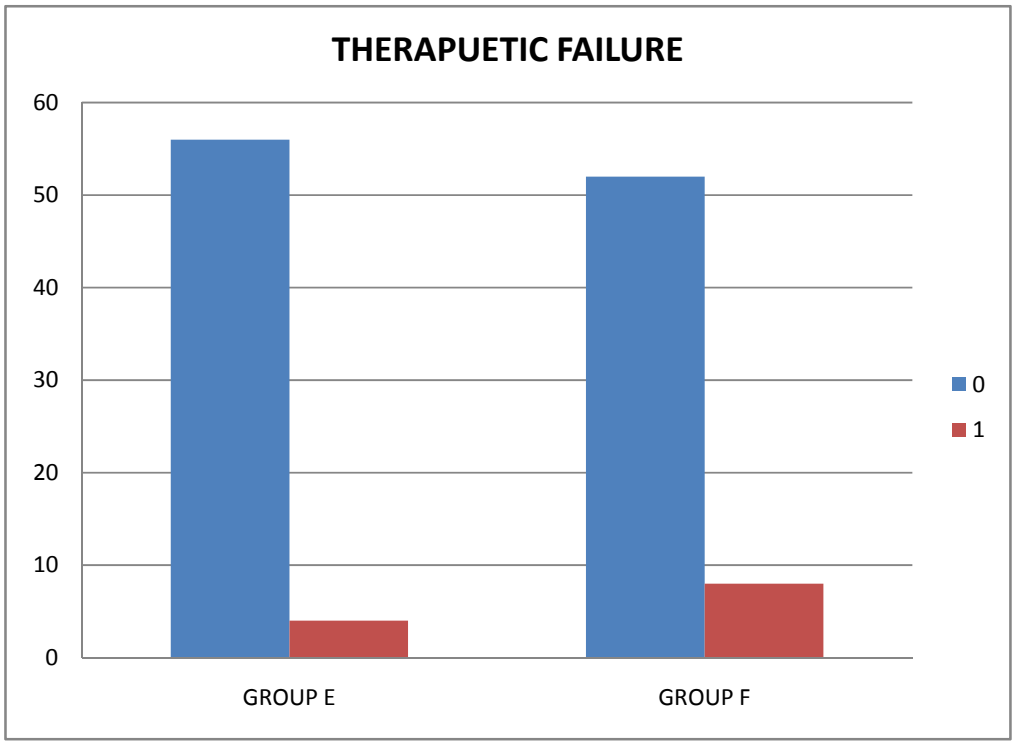

Figure 34. Therapeutic failure

DISCUSSION

Patients with femur fracture requires a continuum of pain management from the time of prehospital admission till final rehabilitation. Optimal perioperative analgesia is an issue to be addressed. A good postoperative analgesic regimen is critically important to attenuate stress response in the postsurgical period to improve postoperative outcomes. Inadequate pain control may lead to serious medical issues such as tachycardia, myocardial ischemia, venous thromboembolism. Adequate postoperative analgesia facilitates earlier patient mobilisation and satisfaction.

The surgeries for fracture neck of femur includes Hemi arthroplasty and DHS. The site of skin incision is in the junction of medial and lateral thigh about 2cm from the ASIS. The cutaneous distribution of this area is covered by the femoral and lateral cutaneous nerve of thigh. The Fascia lata and the Vastus muscles which are retracted during the procedure are supplied by the femoral nerve. A small part of the posterior acetabulam alone is supplied by the nerve to quadratus femoris.

The FICB effectively blocks femoral and lateral cutaneous nerve of thigh, thus provides effective pre and post operative analgesia in patients with fracture neck of femur, femoral shaft fracture, Trochanteric fracture and total hip replacement[37].

Pain following femur surgeries is more pronounced in the first two postoperative days. The pain is aggravated during mobilization. Patients usually receive intravenous opioids for postoperative analgesia. But systemic

opioids provide only static analgesia and doesn't alleviate the dynamic component of pain. Dynamic analgesia is provided mainly by regional anaesthesia techniques in the postoperative period[38]. The gold standard technique that has been used for postoperative pain relief is epidural analgesia. Epidural block with local anesthetics with or without an opioid are superior to other forms of analgesia, but can cause severe hypotension, nausea vomiting, urinary retention, delayed ambulation. There is also risk of developing an epidural hematoma with concomitant use of postoperative anticoagulation[39,40].

Peripheral nerve blocks can be used alternative to epidural analgesia[41], but failure rate was high in peripheral nerve blocks in anatomic landmark based approaches. With the advent of ultra-sonogram, peripheral nerve blocks gain popularity for lower limb surgeries like lumbar plexus block (posterior approach psoas compartment block & anterior approach femoral 3in 1 block), fascia iliaca block , sciatic block. One of the most easiest USG guided peripheral nerve block used for postoperative pain relief especially for femur surgery is the Fascia Iliaca Compartment Block (FICB)[42].

The FICB effectively blocks femoral and lateral cutaneous nerve of thigh, thus provides effective pre and postoperative analgesia in patients with fracture neck of femur, femoral shaft fracture, Trochanteric fracture and total hip replacement.

While there are various studies comparing epidural analgesia with conventional systemic analgesia and there are also studies comparing USG guided FICB with systemic opioids for post-operative pain relief[43], there are only a few studies comparing epidural analgesia with USG guided FICB.

We conducted this randomized prospective double blinded clinical study to compare the analgesic efficacy of USG guided FICB with epidural analgesia for postoperative pain relief in patients undergoing fracture femur surgery under spinal anaesthesia. In this study we tested the hypothesis that USG guided FICB would provide postoperative analgesia that will be comparable to epidural analgesia. A previous study evaluated analgesic efficacy of USG guided FICB with epidural analgesia in knee replacement surgery[44]. In that study VAS scores were evaluated between the 2 groups. This was considered as the primary outcome measure. Postoperative nausea and vomiting, patient satisfaction at the end of 24 hours, rescue analgesia with tramadol, success rate were the other parameters evaluated. But the hemodynamic parameters were not compared between the 2 groups in that study.

So we conducted a study comparing the pains scores between epidural group and FICB group over 24 hours. In addition post-operative nausea and vomiting, patient satisfaction at 24 hours, rescue analgesia with injection tramadol, complications associated with the procedure were evaluated between the 2 groups. The hemodynamic parameter over a period of 24 hours was also compared between FICB group and epidural group. Study was a randomized clinical trial. Study was a double blind study, with both the observer and analyser blinded to the study. Sample size selected was 120, based on previous published article. Based on the proportion of success rate for the two groups, the Epidural group and the FICB group and assuming the significance level of 5% with power of 80%, the required sample size for the study was computed to be 112 minimum.

As far as the inclusion criteria were concerned, patients between age of 18-60 years were selected, since extremes of age will be a confounding variable. As far as ASA physical status concerned, ASA-PS I and ASA-PS II patients were only included in the study.

Patients who were excluded from the study were patients with known hypersensitivity to local anaesthetics, patients with abnormal coagulation status. Since Group E patients received epidural analgesia, patients with abnormal coagulation status were excluded from the study. Patients with severe systemic illness, with skin lesions at the site of blockade were also excluded from the study. For FICB, patients who underwent femoro popliteal bypass surgery were excluded.

Patients from FICB group and Epidural group were analyzed for the demographic profile. Patients mean age and standard deviation were comparable between the FICB group and Epidural group. Sex distribution was also comparable. The mean weight was similar between the two groups and the p-value computed using students t-test was insignificant. The average mean height between the two groups was also similar. So the demographic profile as computed by students t-test and Chi-square test were similar between the FICB group and the Epidural group.

Group E patients received epidural catheter at the time of spinal anaesthesia preoperatively. Group F patients received FICB catheter at the end of the procedure. In group E, patients received epidural analgesia via epidural catheter. 18G Tuohy needle was used to identify epidural space with loss of resistance technique, using midline approach.

In Group F patients, USG guided FICB was performed using high frequency USG probe (6-12MHz). Recognition of hour glass pattern formed by internal oblique, Sartorius and Iliacus muscle, provides reliable, easier and reproducible end points while performing this block based on the study by Harshimran at el. In this technique the needle trajectory is unlikely to encroach on major blood vessels and nerve trunks. Hence the safety and simplicity of this block and its efficacy augmented by ultrasound makes the block most potential for hip fractures. For the same reason it would be very easy to teach and could be performed by healthcare professionals even with limited experience of ultrasound[45].

18G Tuohy needle was used in an inplane approach under USG guidance, it goes through the Sartorius muscle and when it pierces the fascia iliaca, popup is felt. Drug is injected between fascia iliaca and iliacus muscle. 18G Tuohy was chosen based on a study by Justin W.Hail and his collegues. 18G Tuohy needles were clearly defined under realtime USG. Visualisation of the needle tip and large volume of local anaesthetic drug injection since it is a compartment block was the most important factor determining the success of the block.

Optimal needle location is indicated by the appearance of an “anechoic” fluid collection. Then the epidural catheter is inserted 4-6cm beyond the needle tip and 20ml of 0.125%bupivacaineis given and direct visualization of drug spread under fascia by using ultrasound is confirmed.

The local anaesthetic that was used in both the groups was bupivacaine. Bupivacaine is a commonly used drug both in epidural analgesia as well as

USG guided FICB block. In the postoperative recovery room both groups were started with continuous infusion of 0.125% Bupivacaine at a rate of 8ml/hr . Since the mean duration of the surgery was approximately 112 minutes. The groups were comparable in terms of activation of FICB catheter and epidural catheter.

The primary outcome measure that was compared between the FICB group and epidural group, was the pain scores graded by visual analog scores. The VAS scores were graded on a 0-10 cm scale. VAS scores were observed over a period of 24 hour in the postoperative period. VAS scores were observed at 1 hour, 2 hours, 4 hours, 8 hours, 12 hours, 16 hours, 20 hours, 24 hours

The mean VAS scores at all the time intervals, measured were comparable between the FICB group and the epidural group. The p-value computed was statistically not significant. So the analgesic efficacy of USG guided FICB as measured by visual analog pain scores were comparable with epidural analgesia[46].

Visual analog pain scores were used for grading postoperative pain scores based on previous studies by Dolen J et al on patients undergoing hip arthroplasty in these studies, patient received USG guided FICB for postoperative pain relief.

One of the secondary outcome measures that was analyzed was the postoperative nausea and vomiting. Rescue anti-emetics were given with Injection Ondansetron 4 mg intravenously, when the PONV scores were ≥ 2. Average PONV scores were similar in both the groups. Incidence of vomiting

would have been higher if a narcotics were to be used significantly[47]. However in our study only 0.125% bupivacaine was used for epidural analgesia as continuous infusion at a rate of 8ml/hr.

The next outcome measure was postoperative satisfaction score. A score of 3 which means excellent postoperative satisfaction was recorded in 29 patients in Group E compared to 23 patients in group T. The mean postoperative satisfaction was a shade better in the Epidural group. P value is 0.509 , statistically not significant.

Mean VAS scores were comparable between the FICB group and the epidural group. The average post-operative nausea scores were similar in both groups.

In the FCIB group, therapeutic failure rate was 13% . In the epidural group the therapeutic failure rate was 7%. Out of the 4 patients in the epidural group who had therapeutic failure 1 patient had bloody aspirate 6 hour after surgery. 3 patients had inadequate pain relief probably due to catheter migration. As far as the FICB catheter group was concerned, out of 8 patients who had therapeutic failure because of inadequate pain relief probably due to either catheter migration, block in the epidural catheter. In all the patients who had therapeutic failure was given rescue analgesia inj Tramadol.

Rescue analgesia was given as per the patient requirement and on patients' demand. Rescue analgesia was given if VAS scores were greater than or equal to 4. Injection ondansetron 4 mg was given before administering tramadol. Rescue analgesia was required in 15 of the 60 patients in the FICB

group and 9 of the 60 patients in the epidural group. So requirement of rescue analgesia was comparable in both the groups.

There was no incidence of bradycardia, respiratory depression, in both the groups and those are common when opioids are used in neuraxial blockade. Urinary retention was present in 9 patients of epidural group and 2 patients of FICB group. Based on previous study done by sumit datta et al spinal anesthesia was associated with higher incidence of urinary retention (22.2%) with epidural 14.3% [48].

Hypotension is the most common side effects seen with sympathetic denervation in central neuraxial blockade. Risk factors associated with hypotension include hypovolemia, preoperative hypertension, high sensory block height, age older than 40 years, obesity. Physiological effect of sympathetic blockade was reason behind this hypotension in epidural group. But there was no incidence of hypotension reported in the FICB group and Epidural group. Since the concentration used here is 0.125% bupivacaine doesn't cause hypotension in epidural group[44].

As far as the hemodynamic parameters are concerned there was a no fall in systolic blood pressure, diastolic blood pressure a s well as mean arterial pressure at periodic time intervals after activation of epidural catheter. So we concluded that USG guided FICB was comparable to epidural analgesia in terms of post-operative pain relief.

Adverse effects of epidural analgesia include dural puncture, transient neuropathy, spinal hematoma, neuraxial infections, catheter migration. Catheter

migration can be intrathecal or intravascular. Both can present with catastrophic complications. Hypotension is present in epidural anaesthesia due to sympathetic blockade. Lower limb motor block is uncommon when using low concentrations (0.125%) of bupivacaine. Urinary retention is seen when sacral segments S2 to S4 are blocked by epidural analgesia.

Advantages of this USG guided FICB include unilateral analgesia on the side of surgery, less motor blockade and early ambulation. FCIB is devoid of side effects of epidural analgesia such as hypotension, postoperative nausea and vomiting, urinary retention and a motor blockade.

CONCLUSION

From this study it can be concluded that the analgesia following the ultrasound guided Fascia iliaca compartment Block though comparable to epidural analgesia, can be an effective alternative to epidural block, because of its relative simplicity in technique and less invasiveness. Hence we arrived at a conclusion that the FICB holds considerable promise as an effective postoperative analgesia with less side effects compared to Epidural analgesia.

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INSTITUTIONAL ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : A Randomised controlled study comparing the analgesic efficacy of epidural analgesia eith USG guided fascia iliaca compartment block for femur surgery done under sub arachnoids block .

Principal Investigator : Dr. Kousalya.T

Designation : PG MD (Anesthesiology)

Department : Department of Anesthesiology
Government Stanley Medical College,
Chennai-01

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 25.03.2015 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

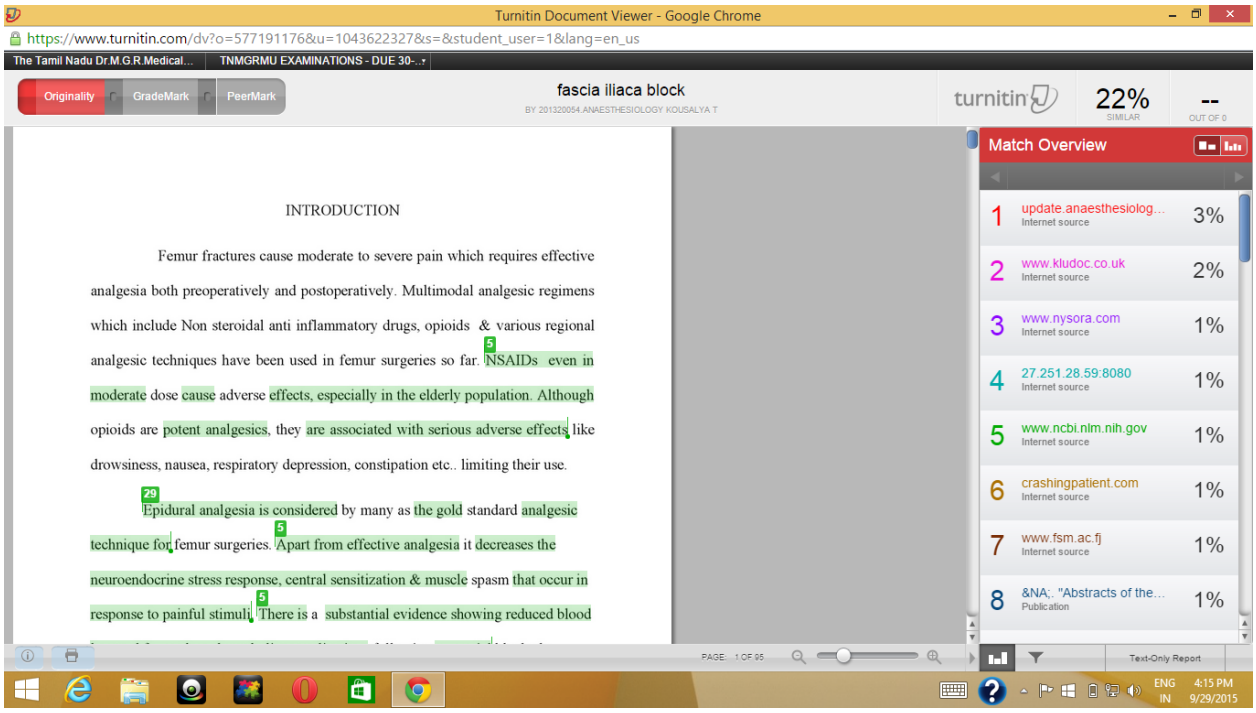
The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

K Vasantha

MEMBER SECRETARY,
IEC, SMC, CHENNAI

MEMBER SECRETARY
ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE
CHENNAI-600 001.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INTRODUCTION
Femur fractures cause moderate to severe pain which requires effective analgesia both preoperatively and postoperatively. Multimodal analgesic regimens which include Non steroidal anti inflammatory drugs, opioids & various regional analgesic techniques have been used in femur surgeries so far. NSAIDs even in moderate dose cause adverse effects, especially in the elderly population. Although opioids are potent analgesics, they are associated with serious adverse effects like drowsiness, nausea, respiratory depression, constipation etc.. limiting their use.
Epidural analgesia is considered by many as the gold standard analgesic technique for femur surgeries. Apart from effective analgesia it decreases the neuroendocrine stress response, central sensitization & muscle spasm that occur in response to painful stimuli. There is a substantial evidence showing reduced blood
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PROFORMA

Name: Age: Sex:

Weight: IP NO: Group:

Diagnosis:

Procedure:

Pre Anaesthetic Assessment:

Plan of Anaesthesia:

Baseline Vital Parameters:

Time of epidural catheter insertion

Time of subarachnoid blockade

Level of blockade

Time of skin incision

Intraoperative details

Time	HR	BP	SpO2	IV Fluids	Drugs

Postoperative details

Time	HR	BP	SpO2	IV Fluids	Drugs

Total duration of surgery

Level of blockade at the end of surgery

Time of Fascia iliaca catheter insertion in group F patient

Time of activation of Fascia iliaca catheter

Time of activation of epidural catheter in group E

Time	BP	Pulse	SpO2	VAS	S Effects
1 hour					
2 hours					
4 hours					
8 hours					
12 hours					
16 hours					
20 hours					
24 hours					

PONV Score

Patient satisfaction at 24 hours

Therapeutic /Technical failure

Rescue Analgesia

Complications

சுய ஒப்புதல் படிவம்

எபிடியூரல் மற்றும் பெசியா இலியாக்கா கம்பார்ட்மெண்ட் பிளாக் முறைகளில் மருந்துகள் கொடுக்கப்படும் போது அதன் வலி நிவாரணத்தன்மை குறித்த ஆய்வு

ஆய்வாளர் : **த.கௌசல்யா**
முதுநிலை பட்டமேற்படிப்பு மாணவி
மயக்கவியல் துறை

வழிகாட்டி : **பேராசிரியர் மரு.குமுதா லிங்கராஜ்**
மயக்கவியல் துறை
அரசு ஸ்டான்லி மருத்துவமனை

மரு.நரசிம்மன்
உதவி பேராசிரியர் மயக்கவியல் துறை
அரசு ஸ்டான்லி மருத்துவமனை

பெயர் : வயது : உள்ளிருப்பு எண். :

இந்த மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை தீர்க்கவும் அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது.

நான் இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்கிறேன். எந்த காரணத்தினாலும் எந்த கட்டத்திலும் எந்த சட்ட சிக்கலும் இன்றி இந்த ஆய்விலிருந்து விலகிக் கொள்ளலாம் என்று அறிந்து கொண்டேன்.

நான் ஆய்விலிருந்து விலகிக்கொண்டாலும் ஆய்வாளர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கோ அல்லது உபயோகிக்கவோ என் அனுமதி தேவையில்லை எனவும் அறிந்து கொண்டேன். என்னை பற்றிய தகவல்கள் ரகசியமாக பாதுக்காக்கப்படும் என்பதையும் அறிவேன்.

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும் பரிசோதனை முடிவுகளையும் ஆய்வாளர் அவர் விருப்பதிற்கேற்ப பயன்படுத்திக் கொள்ளவும் அதனை பிரசுரிக்கவும் முழுமனதுடன் சம்மதிக்கிறேன்.

ஆய்வில் உங்கள் உரிமைகள் :

உங்கள் மருத்துவ பதிவேடுகள் அந்தரங்கமாக வைத்துக் கொள்ளப்படும். இந்த ஆய்வின் முடிவுகள் அறிவியல் பத்திரிக்கைகளில் வெளியிடப்படலாம். இதனால் நீங்களோ உங்கள் பெயரோ வெளியிடப்படாது. ஆய்வில் பங்கேற்பது தன்னிச்சையானது மற்றும் காரணங்கள் எதுவும் கூறாமலேயே நீங்கள் எப்போது வேண்டுமென்றாலும் விலகிக் கொள்ளலாம். ஏதேனும் பக்க விளைவுகள் ஏற்பட்டால் முழு சிகிச்சையும் மருத்துவ குழுவினரால் உடனடியாக வழங்கப்படும்.

நாள் :

நோயாளியின் கையொப்பம்
(அல்லது) இடது பெருவிரல் ரேகை
(மருத்துவரால் படித்து காட்டப்பட்டது)

எபிடியூரல் மற்றும் பெசியா இலியாக்கா கம்பார்ட்மெண்ட் பிளாக் முறைகளில் மருந்துகள் கொடுக்கப்படும் போது அதன் வலி நிவாரணத்தன்மை குறித்த ஆய்வு

ஆராய்ச்சியின் நோக்கமும், ஆதாரங்களும்.

இயல்பாகவே அறுவை சிகிச்சைக்குப் பிறகு, அறுவை சிகிச்சை செய்த இடத்தில் வலி இருக்கும். தொடை எலும்பு முறிவினை சரிசெய்யும் அறுவை சிகிச்சைக்கு முடிந்த முதல் 24 மணி நேரத்திற்கு வலி சற்று அதிகமாகவே இருக்கும். வலியை குறைப்பதற்கு பல்வேறு முறைகளில் (வாய்வழியாக, இரத்தநாளம் மூலமாக, நரம்புகளில் உணர்வுகள் கடத்தப்படுவதை தற்காலிகமாக மருந்துகள் மூலமாக தடுத்தல் (எபிடியூரல் / நெர்வ் பிளாக்) மருந்துகள் வழங்கப்படுகிறது.

ஆய்வு முறை :

இந்த ஆய்வில் எபிடியூரல் முறையில் / பெசியா இலியாக்கா கம்பார்ட்மெண்ட் பிளாக் முறையில் 24 மணி நேரத்திற்கு மருந்துகள் கொடுக்கப்பட்டு வலி எவ்வாறு குறைகிறது என்பது குறித்தும் இவ்விரு முறைகளின் சிறப்பம்சங்கள் குறித்தும் ஆய்வு செய்யப்படுகிறது.

உண்டாகக்கூடிய இடர்கள் :

இந்த ஆய்வில் பயன்படுத்தப்படும் மருந்தினால் வாந்தி, மயக்கம், இதயத்துடிப்பு மற்றும் இரத்த அழுத்தம் குறைதல், காக்கா வலிப்பு ஏற்பட வாய்ப்புகள் உண்டு.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்டுள்ள அறிவுரைகளின்படி நடந்து கொள்வதுடன் ஆய்வாளருக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதி அளிக்கிறேன்.

உடல்நலம் பாதிக்கப்பட்டலோ வழக்கத்திற்கு மாறான நோய்குறி தென்பட்டாலோ அதனை தெரிவிப்பேன் என்று உறுதி கூறுகிறேன்.

இந்த ஆய்வில் எனக்கு எவ்விதமான பரிசோதனைகளையும் சிகிச்சைகளையும் மேற்கொள்ள நான் முழுமனதுடன் சம்மதிக்கிறேன்.

இப்படிக்கு

நோயாளியின் கையொப்பம் ஆய்வாளரின் கையொப்பம்

(பெயர்)

S.No	Group	Name	Age	Sex	IP.No	DOS	Height	Weight	ASA PS	Diagnosis	Procedure	Duration of S	vas 1	vas 2	VAS 4	VAS 8	VAS 12	
1	E	chinnarajammal	59	f	1319243	1/4/2015	158	57	2	intertrocantric RT femur	DHS	120	2	2	1	2	2	
4	E	dhtchinamorthy	55	m	1511678	4/4/2015	162	68	1	neck of femur lt	hemi arthroplasty	90	3	2	3	2	3	
5	E	ramesh	49	m	1517728	6/4/2015	165	76	1	AvN lt femur	Lt THR	140	2	2	3	1	1	
7	E	Ram	48	M	1515197	7/4/2015	166	80	1	intertrocantric lt femur	DHS	100	2	3	2	2	1	
9	E	Birla	60	F	1515648	9/4/2015	156	60	2	intertrocantric RT femur	DHS	130	2	2	2	2	2	
11	E	ganesan	38	m	1514709	11/4/2015	157	76	1	subtrochantric rt femur	pfn	110	1	2	2	3	3	
12	E	ajith	20	m	1518351	13/4/2015	160	54	1	shaft of femur proximal	orif& nailing rt	100	4	5	6	6	5	
15	E	kuppammal	55	f	1516131	21/4/2015	160	65	2	neck of femur lt	THR	90	2	5	3	2	2	
17	E	Bharath	18	m	1517193	21/4/2015	158	55	1	neck of femur rt	cancellous screw fixation	110	2	3	1	1	2	
20	E	Rakshana	19	f	1522196	24/4/2015	164	45	1	neck of femur rt	ORIF & cancellous screw	100	3	3	3	2	3	
21	E	chellammal	60	f	1515270	24/4/2015	159	54	2	intertrochantric lt femur	DHS	80	2	2	2	1	2	
22	E	jagadsh	25	m	1517015	25/4/2015	162	67	1	shaft of femur proximal	ORIF &nailing	120	2	3	2	3	2	
24	E	srinivasan	50	m	1520282	25/4/2015	162	59	1	shaft of femur proximal	ORIF & nail fixation	90	4	5	5	6	7	
27	E	vinoth kumar	28	m	1517913	29/4/2015	165	64	1	shaft of femur proximal	ORIF & nailing	80	2	3	2	3	2	
30	E	Dhamodhran	50	m	1517148	5/5/2015	163	65	2	intertrochantric lt femur	ORIF & IL	120	3	3	3	3	2	
31	E	Alexander	33	m	1518192	6/5/2015	158	60	1	neck of femur	THR	100	4	5	4	3	3	
33	E	Gajedran	24	m	1520593	8/5/2015	160	83	1	shaft of femur proximal	ORIF & IM nailing	100	3	2	3	2	3	
37	E	Varathammal	52	f	1518584	12/5/2015	163	68	1	shaft of femur proximal	ORIF & IM nailing	90	3	2	3	2	3	
38	E	Sakeera bee	60	f	1518584	13/5/2015	159	67	2	neck of femur	hemi arthroplasty	90	2	1	2	3	1	
40	E	Elumalai	43	m	1519858	15/5/2015	164	67	1	intertrochantric femur	ORIF & PFN	100	3	2	1	3	2	
41	E	Gowtham	24	m	1524829	15/5/2015	160	76	2	shaft of femur proximal	ORIF & IM nailing	110	2	3	2	3	1	
42	E	Thaftsal	19	m	1522340	16/5/2015	158	53	1	shaft of femur proximal	orif& nailing rt	120	3	2	2	2	3	
44	E	Sri ragavan	35	m	1523557	19/5/2015	167	65	1	intertrochantric rt femur	ORIF & PFN	100	3	2	1	3	2	
47	E	Balaraman	60	m	1524344	23/5/2015	160	65	2	intertrochantric L femur	DHS	110	2	3	2	3	1	
50	E	Ajithkumar	20	m	1523583	26/5/2015	164	60	1	shaft of femur proximal	ORIF & IM nailing	120	2	3	2	3	2	
53	E	Kamalammal	60	f	1525292	28/5/2015	160	56	2	neck of femur lt	THR	110	2	3	2	2	2	
54	E	Thayarrammal	58	f	1525622	30/5/2015	162	60	2	neck of femur	hemi arthroplasty	100	2	3	3	3	1	
56	E	Chinniyapa	57	m	1527134	3/6/2015	164	67	2	intertrochantric L femur	DHS	110	2	3	1	3	2	
59	E	srinivasan	58	m	1527080	5/6/2015	165	67	2	neck f femur RT	hemi arthroplasty	120	2	3	1	3	2	
60	E	Nelson	30	m	1528709	6/6/2015	158	70	1	shaft of femur proximal	ORIF & IM nailing	110	2	3	2	1	1	
64	E	Rubelemam	60	f	1530035	9/6/2015	156	62	2	neck f femur RT	THR	100	2	3	2	3	2	
65	E	Anandhan	55	m	1529419	9/6/2015	166	70	1	intertrochantric L femur	DHS	110	2	3	1	2	2	
67	E	srinivasan	35	m	1532820	12/6/2015	163	80	1	shaft of femur proximal	ORIF & IM nailing	120	3	5	4	2	3	
69	E	Jeeva	48	m	1528588	13/6/2015	165	87	2	shaft of femur proximal	ORIF & IM nailing	100	2	2	3	3	3	
70	E	Sampath	58	m	1529547	13/6/2015	164	67	2	neck of femur Lt	Hemiarthroplasty	100	3	2	2	2	2	
72	E	Jagan	21	m	1532817	15/6/2015	162	67	1	shaft of femur proximal	ORIF &IM naiing	130	3	2	2	3	2	
74	E	Ram kumar	28	m	1530212	17/6/2015	165	75	1	B/L AVN	THR Lt	150	3	2	3	1	1	
76	E	Paneerselvam	25	m	1518840	18/6/2015	163	78	1	shaft of femur proximal	ORIF & IM nailing	120	3	3	3	3	3	
77	E	Govindasamy	53	m	1539462	19/6/2015	160	67	1	Rt hip dislocation	THR	150	2	3	3	2	2	
79	E	Thirumurugan	35	m	1534395	22/6/2015	165	75	2	shaft of femur proximal	ORIF & IM nailing	100	6	5	7	6	4	
83	E	Venkataiah	60	m	1532159	25/6/2015	160	60	2	intertrochantric lt femur	DCS	140	2	3	2	2	2	
84	E	Paneerselvam	25	m	1518440	25/6/2015	160	68	1	shaft of femur rt	ORIF & IM nailing	120	2	1	2	3	3	
85	E	Jayakanthan	55	m	1532487	26/6/2015	158	64	2	intertrochantric lt femur	ORIF & PFN	120	4	5	6	4	5	

89	E	kuppammal	60	f	1532589	1/7/2015	162	56	2	subtrochantric rt femur	ORIF & DCS	120	2	3	2	2	3
90	E	Kalaivanan	37	m	1530325	1/7/2015	164	78	1	intertrochantric lt femur	ORIF & IM nailing	120	2	3	2	3	2
93	E	Ilamathy	37	m	1534917	4/7/2015	162	78	1	intertrochantric lt femur	ORIF & PFN	130	2	3	2	3	2
94	E	Bujiammal	60	m	1534139	4/7/2015	160	60	2	intertrochantric rt femur	DHS	120	2	3	2	1	2
96	E	Sivakumar	29	m	1537365	6/7/2015	158	78	1	B/L AVN	Lt hemiarthroplasty	130	2	3	2	3	3
99	E	Parasuraman	30	m	1536485	8/7/2015	160	70	1	shaft of femur Lt	ORIF& IM nailing	120	2	3	2	3	2
100	E	Manikanda	21	m	1537455	9/7/2015	162	67	1	shaft of femur Rt	ORIf & IL nailing	140	2	2	2	1	2
103	E	Sekar	39	m	1536205	10/7/2015	163	70	1	intertrochantric Rt femur	ORIF & IM nailing	110	2	3	2	2	2
104	E	Noornisha	60	f	1531830	11/7/2015	159	67	2	intertrochantric lt femur	DHS	120	4	5	4	5	7
106	E	Saravanan	55	m	1537367	13/7/2015	163	70	1	neck of femur Lt	Hemiarthroplasty	120	2	3	2	2	2
108	E	sivakumar	29	m	1537365	13/7/2015	162	76	1	AVN lt hip	hemiarthroplasty	110	2	2	3	2	3
110	E	Ramkumar	25	m	1503212	15/7/2015	160	70	1	AVN Lt hip/post THR	revision THR	130	2	1	2	2	3
112	E	Nandakumar	60	m	1539680	16/7/2015	160	60	2	intertrochantric rt femur	ORIF & PFN	130	2	3	2	2	3
113	E	Manimaran	19	m	1540065	17/7/2015	162	55	1	neck of femur lt	Orif&cancellousscrew fix	100	3	4	5	3	3
115	E	Balaraman	60	m	1538223	20/7/2015	159	55	2	OA hip jt Rt	THR	135	2	3	2	3	2
117	E	Pankajam	60	f	1549048	21/7/2015	165	60	2	intertrocantric femur Lt	DHS	100	3	4	3	5	4
120	E	Mohan	30	m	1535369	25/7/2015	160	70	1	AVN lt femoral head	THR	130	2	1	2	3	2
2	F	hussain ahamad	59	m	1513531	2/4/2015	160	63	2	neck of femur lt	hemi arthroplasty	120	2	3	2	3	2
3	F	hemavathy	60	f	1513954	4/4/2015	160	70	2	intertrocantric RT femur	dhs	120	1	2	2	3	3
6	F	vellmmal	58	f	1515402	6/4/2015	159	53	2	intertrocantric lt femur	DHS	120	2	2	3	2	3
8	F	Gangadharan	35	M	1511470	8/4/2015	160	75	1	shaft of femur proximal	orif & plating	130	3	3	2	3	3
10	F	Jayalakshmi	50	f	1515278	10/4/2015	160	65	1	intertrochantric lt femur	Dcs	90	2	3	2	3	2
13	F	Yesu	60	m	1515278	17/4/2015	163	67	2	intertrochatric rt femur	PFN	110	3	3	4	5	6
14	F	shayad ahamed	59	m	1513127	20/4/2015	162	59	2	neck of femur lt	hemi arthroplasty	120	2	3	3	2	3
16	F	Meroj ram	23	m	1518841	21/4/2015	164	71	1	shaft of femur proximal	orif & plating	120	2	3	3	2	3
18	F	Chokkalingam	60	m	1517496	22/4/2015	161	53	2	intertrochantric lt femur	pfn	130	3	4	4	5	3
19	F	Jayalakshmi	57	f	1520432	23/4/2015	160	56	2	neck of femur rt	hemi arthroplasty	100	2	1	2	2	1
23	F	yasodammal	59	f	1518913	25/4/2015	164	68	2	neck of femur	hemi arthroplasty	120	5	6	5	6	5
25	F	Prakasam	24	m	1511940	27/4/2015	160	65	1	shaft of femur proximal	ORIF & nailing	110	2	3	2	1	3
26	F	kothandam	35	m	1518597	28/4/2015	163	75	1	shaft of femur proximal	ORIF & nailing	100	2	3	2	2	3
28	F	sivaramakrishnan	52	m	1522655	4/5/20154	163	68	1	intertrochantric lt femur	DHS	120	2	2	1	2	1
29	F	harikrishnan	21	m	1523357	4/5/2015	167	60	1	shaft of femur proximal	ORIF & IL	130	3	4	5	4	3
32	F	Elumalai	37	m	1518428	8/5/2015	167	67	1	intertrochantric rt femur	ORIF & DHS	110	4	5	6	6	6
34	F	Vinoth	26	m	1524153	9/5/2015	159	78	1	AvN lt femur	THR	100	2	1	1	2	1
35	F	Ganesha	54	m	1524989	11/5/2015	162	75	2	subtrochantric rt femur	PFN	120	2	3	2	3	1
36	F	Ashis	20	m	1524482	11/5/2015	165	46	1	shaft of femur proximal	DCP	120	1	1	1	2	2
39	F	Veeraman	31	m	1522470	14/5/2015	162	57	1	shaft of femur proximal	ORIF & IM nailing	110	2	3	3	3	3
43	F	Rathina kumari	57	m	1525201	17/5/2015	162	72	1	neck of femur lt	THR	100	2	3	2	3	2
45	F	Baranitharan	43	m	1526225	19/5/2015	164	80	1	chronic arthritis L hip	THR	130	1	1	1	2	3
46	F	Pandiyanathan	45	m	1526897	22/5/2015	165	76	1	inertrochantric L femur	DHS	130	2	3	1	2	2
48	F	Mukunthan	58	m	1527392	25/5/2015	167	70	2	intertrochantric L femur	DHS	120	2	3	2	3	2
49	F	Parasuraman	45	m	1526225	26/5/2015	163	67	1	chronic arthritis L hip	THR	100	2	2	2	3	3
51	F	Nafisha	51	f	1524312	27/5/2015	160	55	2	neck of femur	hemi arthroplasty	120	3	4	5	5	6
52	F	Pallavan	60	m	1524324	27/5/2015	156	65	2	Intertrochantric L femur	DHS	110	2	3	2	3	2

55	F	Sayad	50	m	152672	2/6/2015	156	70	2	AvN lt femur	THR	110	3	3	3	3	3
57	F	hemavathy	60	f	1513954	3/6/2015	162	67	2	neck of femur	THR	120	2	1	2	2	2
58	F	Nallarajan	49	m	1528019	4/6/2015	167	78	2	intertrochantric L femur	DHS	100	1	2	2	2	2
61	F	Subramani	60	m	1521285	8/6/2015	161	67	2	neck of femur	Hemiarthroplasty	110	2	3	2	2	3
62	F	Radai	60	f	1529706	5/6/2015	159	65	2	intertrochantric L femur	DHS	120	2	1	1	2	1
63	F	Iman	57	m	1529833	9/6/2015	160	60	2	intertrochantric rt femur	DHS	110	1	2	1	2	2
66	F	Netharaj	54	m	1527363	10/6/2015	164	78	2	neck of femur Lt	THR	100	3	2	3	2	3
68	F	Poongavanam	60	f	1525651	13/6/2015	160	56	2	intertrochantric rt femur	DHS	90	2	2	3	3	3
71	F	Dhanalakshmi	32	f	1532148	15/6/2015	163	52	1	avn lt femur head	THR	90	2	1	2	1	2
73	F	Lakshmi	55	f	1532461	16/6/2015	159	67	2	intertrochantric rt femur	ORIF & DCS	120	4	5	4	5	6
75	F	Arun kumar	23	m	1530320	17/6/2015	159	68	1	shaft of femur proximal	ORIF & IM nailing	110	2	2	3	2	2
78	F	Sujatha	38	f	1531033	20/6/2015	165	58	1	AVN Rt femur head	THR	130	1	2	2	2	2
80	F	srinivasan	35	m	1532400	23/6/2015	164	65	1	shaft of femur proximal	ORIF & IM nailing	120	2	1	3	2	3
81	F	Karthikeyan	20	m	1533972	23/6/2015	168	57	1	shaft of femur proximal	ORIF & IM nailing	110	2	1	3	3	2
82	F	Lorence peter	59	m	1535224	24/6/2015	159	67	2	shaft of femur Rt	ORIF & IM nailing	110	3	4	5	3	2
86	F	Raja	50	m	1535793	29/6/2015	158	65	1	shaft of femur rt	ORIF & IM nailing	100	2	1	2	3	3
87	F	Prabavathy	60	f	1533013	30/6/2015	160	70	2	neck of femur rt	THR	110	2	1	3	3	2
88	F	Ranganathan	58	m	1534145	30/6/2015	160	67	2	intertrochantric rt femur	DHS	100	2	2	3	3	3
91	F	Kamtchi	46	f	1533960	2/7/2015	165	68	1	subtrochantric rt femur	ORIF & DCS	90	2	3	5	3	4
92	F	Shekaran	60	m	1536691	2/7/2015	159	55	2	intertrochantric lt femur	DHS	100	2	2	2	3	2
95	F	Mari	60	m	1536745	6/7/2015	158	67	2	chronic arthritis L hip	THR	90	2	1	2	1	3
97	F	Sridhar	46	m	1535415	7/7/2015	165	75	2	neck of femur Lt	ORIF & IM nailing	100	4	5	6	5	7
98	F	Baba bakruth	45	m	1533402	8/7/2015	159	67	2	intertrochantric rt femur	DCS	120	2	1	2	1	3
101	F	Annadurai	52	m	1533913	10/7/2015	164	70	1	neck of femur Rt	Hemiarthroplasty	100	2	3	2	1	2
102	F	Ravi	38	m	1538483	10/7/2015	165	78	1	nonunion neck of femur	Hemiarthroplasty	90	2	1	1	2	3
105	F	Ponnusamy	57	f	1534626	11/7/2015	164	68	1	intertrochantric rt femur	DHS	120	4	5	6	5	6
107	F	karthick	30	m	1546789	13/7/2015	156	67	1	shaft of femur Lt	ORIF & IM nailing	110	2	2	1	3	1
109	F	Sekar	39	m	1536205	14/7/2015	163	67	1	intertrocantric lt femur	DHS	100	2	1	3	2	3
111	F	Jamuna	60	f	1538279	16/7/2015	159	56	2	neck of femur lt	Hemiarthroplasty	90	4	5	6	5	6
114	F	kumar	38	m	1534724	20/7/2015	164	78	1	intertrocantric RT femur	DHS	120	2	2	1	3	1
116	F	Mary	60	f	1539181	21/7/2015	164	65	2	neck f femur RT	Hemiarthroplasty	100	1	2	2	1	3
118	F	Vasantha	56	f	1539040	23/7/2015	162	65	2	neck of femur lt	Hemiarthroplasty	110	3	4	2	3	3
119	F	Ravan	20	m	1540006	24/7/2015	165	70	2	proximal femur	ORIF & PFN	100	2	3	4	5	2

VAS 16	VAS 20	VAS 24	HR1	HR2	HR 4	HR 8	HR 12	HR 16	HR 20	HR 24	SBP 1	SBP 2	SBP 4	SBP 8	SBP 12	SBP 16	SBP 20	SBP 24	DBP 1	DBP 2
2	2	2	70	78	68	70	78	80	76	82	142	140	136	130	138	134	132	136	80	80
2	2	2	66	68	70	68	67	66	64	66	130	120	116	114	116	128	124	130	80	82
2	1	2	86	82	74	76	77	78	80	82	120	124	118	116	118	122	126	130	76	78
1	2	2	98	90	88	89	86	87	82	80	90	120	124	126	128	124	126	130	60	68
3	3	2	87	88	82	80	84	86	84	80	140	134	136	138	140	138	136	138	88	86
2	2	3	86	88	90	86	84	82	86	90	130	128	128	130	132	134	128	130	86	88
6	6	5	88	90	92	86	84	92	94	96	136	132	128	126	134	132	130	138	90	86
3	2	2	80	86	83	85	86	88	87	88	120	116	124	120	127	130	128	124	87	85
2	1	3	76	74	70	68	66	72	74	76	110	108	104	116	118	120	100	106	70	74
3	2	3	76	78	74	80	82	84	78	70	120	124	126	122	118	116	120	24	74	70
1	2	2	72	66	68	66	64	70	72	68	120	118	120	120	124	126	120	120	74	76
2	3	3	66	64	66	63	60	60	66	65	120	118	112	118	116	120	124	128	76	78
4	5	4	79	76	85	86	78	90	93	86	140	134	138	136	130	142	146	138	90	86
2	3	2	65	64	63	60	65	60	62	67	118	120	124	108	105	108	110	112	76	78
3	2	3	78	76	74	76	78	80	71	73	118	112	114	115	120	126	128	130	87	84
2	3	2	77	75	74	77	76	72	70	74	114	116	110	120	124	126	124	120	74	78
2	2	3	66	65	66	68	64	66	64	63	118	114	115	117	113	119	120	124	73	75
3	2	3	67	68	67	70	72	74	76	71	130	115	128	125	129	130	134	125	78	85
3	2	2	76	73	78	80	82	75	78	72	128	124	116	110	124	126	123	116	74	70
2	2	2	67	78	76	74	69	70	72	73	116	118	114	110	105	108	110	120	68	64
2	3	3	89	85	86	80	72	76	70	80	130	94	100	120	118	116	120	124	80	56
2	3	2	78	68	70	75	74	76	76	70	120	124	116	118	120	123	124	126	80	78
1	2	3	65	64	67	66	62	68	62	60	120	124	126	118	116	118	120	124	76	78
3	2	2	60	66	65	66	69	65	62	60	130	136	128	126	134	130	134	129	74	76
2	3	2	67	68	66	65	70	72	73	67	120	112	114	105	108	110	123	118	76	78
2	2	2	78	74	68	60	66	70	72	74	124	126	123	118	108	105	110	112	78	78
3	2	2	76	74	70	70	70	75	73	70	126	118	116	128	120	127	125	115	68	67
3	2	3	68	66	67	64	60	65	66	63	120	125	124	123	126	118	119	114	76	78
1	1	2	67	68	67	65	60	66	62	66	116	117	114	115	110	120	118	114	70	67
3	2	2	75	67	78	65	67	68	72	71	112	118	120	124	126	120	118	124	70	72
2	2	2	76	76	72	70	74	75	77	78	118	123	124	125	120	127	124	118	70	67
1	2	1	78	76	73	79	80	69	77	72	112	114	116	117	112	120	124	118	73	76
4	3	3	78	89	68	66	68	74	75	77	114	116	118	114	120	124	125	116	75	70
3	3	3	76	74	75	76	77	73	70	70	113	114	121	113	110	112	124	123	70	67
2	3	2	67	65	65	67	68	69	70	72	116	118	104	107	110	115	112	108	70	73
2	2	2	67	65	59	62	66	67	65	70	120	123	125	126	123	120	120	120	70	72
2	3	2	65	65	65	66	62	64	69	63	120	124	117	118	115	110	108	110	72	76
3	3	3	73	73	75	70	68	69	72	75	124	123	125	120	118	116	118	124	78	76
3	2	2	75	68	69	70	72	71	74	74	106	108	110	105	98	100	105	108	60	62
6	8	7	89	90	92	87	88	92	87	87	128	134	136	132	137	135	128	126	80	82
1	3	3	78	68	70	72	74	78	80	82	124	120	128	122	118	109	120	126	78	80
2	3	2	85	86	89	78	80	82	80	82	110	108	110	104	110	116	120	108	67	68
5	6	7	78	89	76	80	82	84	88	80	120	124	126	124	128	126	130	127	70	72

2	2	2	66	64	66	66	70	68	70	72	110	118	112	116	120	120	118	120	70	72
2	3	3	78	76	78	70	72	74	78	80	120	124	126	128	120	118	116	120	78	80
3	2	3	80	82	84	86	88	87	78	80	130	132	130	136	128	126	125	126	80	82
3	2	1	66	64	65	68	66	63	66	62	130	108	94	106	110	118	120	126	82	66
2	3	2	74	77	76	78	80	82	80	80	128	125	124	126	128	130	132	136	78	80
1	2	2	78	76	74	76	79	80	80	82	138	136	130	136	130	128	132	138	80	80
1	2	2	79	78	80	82	84	80	86	80	120	126	128	130	132	128	124	130	78	76
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6	6	5	88	87	89	90	92	93	88	80	138	140	142	144	136	148	136	140	70	72
2	2	3	56	62	63	58	60	62	60	58	140	100	128	130	120	124	134	140	78	89
2	3	2	67	68	70	75	76	72	70	76	130	128	126	124	130	118	116	110	76	77
2	2	3	77	76	77	88	80	82	84	86	120	124	126	124	118	116	114	110	72	78
2	2	2	87	88	85	80	83	88	90	82	140	134	137	142	140	136	138	140	72	78
4	3	3	87	88	89	90	82	79	75	80	120	118	114	118	120	109	104	118	74	76
3	2	2	67	79	64	66	70	72	74	70	104	108	98	106	110	112	110	108	67	66
3	4	3	68	72	78	70	73	75	70	70	130	128	126	130	120	128	126	120	78	76
2	3	1	67	65	64	68	67	60	62	68	120	124	125	120	126	123	120	118	67	68
2	1	3	94	84	88	86	87	80	86	92	138	136	134	140	138	142	142	140	78	76
3	2	2	84	88	87	89	90	78	83	85	119	112	115	116	108	110	116	119	76	78
2	2	2	87	88	80	87	78	80	80	87	119	124	118	116	114	120	126	130	78	76
2	3	2	66	65	69	79	87	74	76	72	125	123	120	126	126	124	130	132	82	80
2	2	2	87	78	76	80	82	84	87	85	118	108	122	126	118	116	115	120	67	68
4	5	3	67	78	75	76	75	70	68	67	114	110	108	115	117	111	110	104	65	67
2	2	3	78	86	82	80	80	80	76	80	120	114	120	120	118	86	102	110	70	72
2	3	3	67	68	70	72	74	70	76	80	118	112	109	106	110	120	120	116	67	68
4	4	3	67	68	78	74	76	70	72	74	116	114	108	108	123	116	114	118	72	76
2	3	2	87	89	90	92	86	87	84	86	114	108	105	112	118	120	124	126	78	76
4	3	5	89	87	80	78	76	83	85	86	130	128	125	130	132	132	130	128	78	76
3	3	2	65	66	64	60	66	60	64	67	120	120	118	113	112	120	115	120	67	68
3	3	3	67	78	68	70	72	68	67	70	116	106	98	100	107	104	112	105	70	68
2	1	2	67	78	70	72	74	75	78	71	110	87	116	126	130	128	124	120	68	66
3	3	4	78	80	82	84	80	78	76	78	118	116	110	108	106	114	120	105	67	65
5	5	6	89	90	92	95	96	100	97	102	130	138	136	140	142	140	140	140	78	78
1	1	2	79	76	80	80	82	78	76	80	103	100	108	110	100	105	116	120	67	68
2	2	2	67	65	66	66	67	70	63	62	108	110	112	120	120	120	124	118	67	70
2	2	2	65	66	67	70	72	76	72	72	130	134	136	124	128	130	130	130	65	67
1	1	1	87	88	80	90	92	92	90	90	120	118	116	114	110	112	116	118	70	70
1	1	2	78	76	79	80	82	83	85	86	132	124	128	130	130	128	130	132	80	80
2	3	2	65	64	64	66	64	65	58	60	132	130	128	128	126	123	124	130	80	87
1	2	3	98	95	97	90	92	93	90	93	86	120	124	127	124	130	130	128	60	76
2	3	2	78	76	74	70	71	70	70	70	120	123	126	130	134	136	128	125	76	78
3	3	3	56	67	60	60	60	60	64	62	110	112	110	110	118	108	106	110	67	65
6	7	6	87	80	88	90	92	90	90	93	140	134	138	138	140	142	140	140	76	79
3	2	3	67	66	66	65	65	65	68	60	102	100	100	105	110	98	100	100	60	67

3	3	3	70	70	72	70	73	70	74	77	120	123	124	120	124	126	124	120	70	72
2	1	1	67	66	67	66	59	65	65	66	110	104	120	118	115	120	110	118	70	72
2	2	2	89	88	80	90	82	85	85	85	130	134	140	142	142	140	138	140	76	76
2	2	2	67	68	70	70	72	74	74	76	110	112	112	114	117	120	122	120	68	70
1	3	2	70	76	75	70	70	75	76	70	123	124	122	120	110	110	110	108	70	72
3	1	2	67	67	65	66	68	70	72	74	140	138	130	142	140	140	142	140	80	84
2	2	3	80	87	89	86	78	87	80	90	100	138	140	142	98	142	140	139	68	78
2	3	2	80	82	82	80	83	84	80	80	120	124	125	126	128	130	130	130	78	78
2	1	2	70	72	74	76	76	78	80	80	110	108	106	110	120	124	108	120	80	82
7	6	6	80	86	86	87	87	88	90	92	130	128	130	126	128	134	125	128	78	76
3	2	3	76	70	72	76	70	80	73	75	100	98	107	105	109	110	112	100	60	62
2	2	2	67	68	79	72	74	76	77	75	120	124	124	126	123	128	130	120	78	75
2	3	3	89	90	78	80	82	86	87	88	100	88	106	110	111	120	126	120	67	60
1	3	2	78	80	82	80	84	88	86	87	120	125	126	123	120	126	127	124	78	76
3	3	3	78	79	80	83	84	84	78	85	124	127	129	130	132	128	125	128	80	82
3	2	2	80	80	87	85	80	85	80	88	134	136	138	134	130	132	130	136	80	82
2	2	2	67	70	65	66	64	66	68	70	128	126	124	124	125	127	128	120	67	65
2	2	3	78	79	80	82	84	80	82	87	130	120	128	126	124	120	124	130	87	80
3	3	3	67	66	65	69	70	76	78	78	95	100	120	124	126	130	125	126	60	63
3	2	2	78	72	70	76	74	76	78	80	112	110	108	116	119	120	124	120	67	68
2	2	1	67	68	70	72	74	75	76	80	124	126	125	120	118	108	110	112	67	66
7	8	6	89	90	93	94	89	95	96	100	100	107	112	115	114	120	125	113	65	67
2	3	2	67	66	67	68	70	71	72	74	130	134	136	140	132	130	140	138	80	82
1	1	2	65	65	64	60	65	66	68	70	126	124	125	118	116	120	124	120	78	79
1	3	2	70	78	72	74	76	77	78	80	120	124	126	124	117	115	119	120	67	70
7	5	6	87	89	90	93	96	98	100	96	130	134	128	138	130	132	136	140	80	83
2	3	3	70	72	73	78	70	80	82	84	126	124	123	126	117	118	120	115	87	85
2	2	1	76	78	80	82	87	85	80	82	130	100	104	124	118	124	130	130	90	65
5	6	7	90	92	94	96	102	105	95	94	140	130	137	136	128	137	140	137	89	86
3	1	3	67	72	76	70	68	73	74	76	108	100	98	100	110	96	100	100	60	64
2	3	2	67	70	73	75	75	75	78	80	120	124	126	128	130	118	116	120	70	72
3	3	3	89	95	87	78	80	83	80	85	124	125	120	118	116	110	108	115	70	75
2	3	3	78	79	89	80	90	85	87	86	140	128	134	128	139	140	136	132	89	90

DBP 4	DBP 8	DBP 12	DBP 16	DBP 20	DBP 24	MAP 1	MAP 2	MAP4	MAP8	MAP 12	MAP 16	MAP 20	MAP 24	SpO_2 1	SpO2 2	Sp02 4	Sp02 8	Sp02 12	Sp02 16	Sp02 20
82	70	84	90	86	84	100	100	100	90	102	104.6667	101.3333	101.3333	99	99	98	99	100	100	99
76	78	82	76	74	80	93.33333	89.33333	89.33333	90	93.33333	93.33333	90.66667	96.66667	99	99	99	98	99	99	98
80	82	76	78	82	82	92	92.66667	92.66667	93.33333	90	92.66667	96.66667	98	99	99	98	100	100	99	99
70	72	72	70	68	68	80	88	88	90	90.66667	88	87.33333	88.66667	99	99	100	99	100	100	99
90	84	86	90	90	90	103.3333	105.3333	105.3333	102	104	106	105.3333	106	99	99	98	99	99	99	99
82	84	86	82	86	88	100	97.33333	97.33333	99.33333	101.3333	99.33333	100	102	99	99	99	98	99	98	99
88	90	86	88	90	86	104	101.3333	101.3333	102	102	102.6667	103.3333	103.3333	99	99	99	100	100	99	99
88	84	82	80	84	86	96.66667	100	100	96	97	96.66667	98.66667	98.66667	99	99	98	99	100	100	100
68	66	72	68	80	73	82.66667	80	80	82.66667	87.33333	85.33333	86.66667	84	99	99	99	98	99	99	100
72	74	73	75	78	72	90.66667	90	90	90	88	88.66667	92	56	99	100	99	100	99	99	99
78	75	73	72	74	70	88.66667	92	92	90	90	90	89.33333	86.66667	99	99	99	99	98	98	99
74	77	72	70	74	70	90	86.66667	86.66667	90.66667	86.66667	86.66667	90.66667	89.33333	99	99	98	99	100	100	100
88	90	92	88	84	86	104.6667	104.6667	104.6667	105.3333	104.6667	106	104.6667	103.3333	99	99	99	98	99	99	100
80	68	68	70	72	70	90.66667	94.66667	94.66667	81.33333	80.33333	82.66667	84.66667	84	99	99	100	100	99	99	99
80	82	83	80	84	80	95.33333	91.33333	91.33333	93	95.33333	95.33333	98.66667	96.66667	100	99	99	100	100	98	99
76	70	72	76	74	78	88	87.33333	87.33333	86.66667	89.33333	92.66667	90.66667	92	98	99	99	99	99	100	100
71	68	70	72	70	71	86.66667	85.66667	85.66667	84.33333	84.33333	87.66667	86.66667	88.66667	99	99	98	99	100	99	100
86	78	75	86	90	86	90.33333	100	100	93.66667	93	100.6667	104.6667	99	99	100	100	100	99	99	99
71	68	66	70	70	70	90.66667	86	86	82	85.33333	88.66667	87.66667	85.33333	100	99	99	100	100	98	99
66	68	70	65	66	65	84.66667	82	82	82	81.66667	79.33333	80.66667	83.33333	98	98	99	99	99	100	100
70	67	66	64	66	68	84.66667	80	80	84.66667	83.33333	81.33333	84	86.66667	99	99	98	99	98	99	100
76	73	70	76	78	74	94.66667	89.33333	89.33333	88	86.66667	91.66667	93.33333	91.33333	99	99	100	99	100	100	99
76	72	70	75	76	70	92	92.66667	92.66667	87.33333	85.33333	89.33333	90.66667	88	98	99	99	100	99	100	100
78	74	68	70	78	73	94.66667	94.66667	94.66667	91.33333	90	90	96.66667	91.66667	99	99	100	100	99	100	100
76	74	73	68	68	70	88	88.66667	88.66667	84.33333	84.66667	82	86.33333	86	100	99	99	100	100	99	100
76	72	73	70	69	70	94	91.66667	91.66667	87.33333	84.66667	81.66667	82.66667	84	98	99	99	99	99	99	99
69	67	70	72	67	68	84.66667	84.66667	84.66667	87.33333	86.66667	90.33333	86.33333	83.66667	99	99	98	99	98	98	99
76	69	70	72	73	69	92.33333	92	92	87	88.66667	87.33333	88.33333	84	99	99	100	100	99	100	100
70	72	73	68	69	70	85.66667	84.66667	84.66667	86.33333	85.33333	85.33333	85.33333	84.66667	98	99	99	100	100	99	100
70	69	70	72	70	70	86	86.66667	86.66667	87.33333	88.66667	88	86	88	99	99	98	99	99	98	99
68	67	72	73	70	70	87.66667	86.66667	86.66667	86.33333	88	91	88	86	99	99	100	99	99	100	99
75	79	80	76	78	76	86.66667	88.66667	88.66667	91.66667	90.66667	90.66667	93.33333	90	100	99	99	98	98	99	98
72	73	70	68	66	69	88.66667	87.33333	87.33333	86.66667	86.66667	86.66667	85.66667	84.66667	99	98	99	99	100	99	99
67	68	65	66	68	70	84.66667	85	85	83	80	81.33333	86.66667	87.66667	99	99	98	98	98	99	99
66	68	69	70	70	68	86	78.66667	78.66667	81	82.66667	85	84	81.33333	98	98	99	99	98	98	98
76	76	78	72	75	76	87.66667	92.33333	92.33333	92.66667	93	88	90	90.66667	98	98	99	99	98	98	99
74	69	70	72	72	76	89.33333	88.33333	88.33333	85.33333	85	84.66667	84	87.33333	99	100	100	98	98	99	99
75	79	80	74	79	80	93	91.66667	91.66667	92.66667	92.66667	88	92	94.66667	99	99	98	98	99	99	98
64	66	60	62	64	65	76	79.33333	79.33333	79	72.66667	74.66667	77.66667	79.33333	99	99	98	98	99	99	100
84	80	85	78	85	80	98	101.3333	101.3333	97.33333	102.3333	97	99.33333	95.33333	99	99	98	99	99	99	98
75	76	80	82	80	80	92	92.66667	92.66667	91.33333	92.66667	91	93.33333	95.33333	99	99	98	99	99	99	98
70	70	68	66	70	70	80.66667	83.33333	83.33333	81.33333	82	82.66667	86.66667	82.66667	98	99	99	99	99	98	98
76	74	77	70	72	72	88	92.66667	92.66667	90.66667	94	88.66667	91.33333	90.33333	98	99	99	99	99	98	98

74	70	72	70	74	70	86	86.66667	86.66667	85.33333	88	86.66667	88.66667	86.66667	8	99	99	98	99	98	99
82	84	80	82	84	84	93.33333	96.66667	96.66667	98.66667	93.33333	94	94.66667	96		99	99	98	99	98	99
83	84	86	80	82	80	97.33333	98.66667	98.66667	101.3333	100	95.33333	96.33333	95.33333		99	99	99	99	99	99
60	64	72	74	74	76	90.66667	71.33333	71.33333	78	84.66667	88.66667	89.33333	92.66667		99	99	99		99	99
82	84	78	80	80	86	93.66667	96	96	98	94.66667	96.66667	97.33333	102.6667		99	99	99	99	99	99
84	86	80	78	80	82	98.66667	99.33333	99.33333	102.6667	96.66667	94.66667	97.33333	100.6667		99	9	99			99
80	82	80	82	78	80	94	96	96	98	97.33333	97.33333	93.33333	96.66667		99	98	99		99	99
74	80	82	88	80	80	92.66667	89.33333	89.33333	92.66667	93.33333	96.66667	92.66667	93.33333		99	99	98		98	99
76	78	80	72	76	80	93.33333	98	98	100	98.66667	97.33333	96	100		99	99	100		98	99
86	80	78	76	77	80	85.33333	100	100	96.66667	92	92	96	100			98	98		99	
70	73	72	68	68	70	93.33333	88.66667	88.66667	90	91.33333	84.66667	84	83.33333	98		98	98	98	99	99
76	74	80	69	70	70	89.33333	92.66667	92.66667	90.66667	92.66667	84.66667	84.66667	83.33333	99		98	98	99	98	
73	79	80	74	80	80	92.66667	94.33333	94.33333	100	100	94.66667	99.33333	100	99	98	99	98	99	98	
78	73	76	80	72	78	88.66667	90	90	88	90.66667	89.66667	82.66667	91.33333	98	99	99	99	98	98	
68	70	65	68	70	70	80.66667	78	78	82	80	82.66667	83.33333	82.66667	98	99	99	99	98	99	98
74	80	73	75	70	70	94.66667	91.33333	91.33333	96.66667	88.66667	92.66667	88.66667	86.66667	98	98	99	99	98	99	99
69	67	70	72	68	68	86	87.66667	87.66667	84.66667	88.66667	89	85.33333	84.66667	99	98	98	99	99	99	99
78	79	80	82	80	78	97.33333	96.66667	96.66667	99.33333	99.33333	102	100.6667	98.66667	99	98	98	99	99	99	98
80	76	74	70	72	78	88	91.66667	91.66667	89.33333	85.33333	83.33333	86.66667	91.66667	99	99	99	99	99	98	98
77	80	82	84	78	80	93.33333	90.66667	90.66667	92	92.66667	96	94	96.66667	99	99	99	99	99	98	98
81	78	80	76	80	82	95.66667	94	94	94	95.33333	92	96.66667	98.66667	98	99	99	99	98	99	99
72	74	76	80	82	80	80.66667	88.66667	88.66667	91.33333	90	92	93	93.33333	98	99	99	99	98	99	99
70	71	69	70	65	68	80	82.66667	82.66667	85.66667	85	83.66667	80	80	99	98	99		99	99	99
73	76	78	56	82	68	84.66667	88.66667	88.66667	90.66667	91.33333	66	88.66667	82	99	98	98	99	99	99	99
70	75	73	70	71	75	82	83	83	85.33333	85.33333	86.66667	87.33333	88.66667	99	99	100	98	99	99	98
78	74	79	80	82	75	86	88	88	85.33333	93.66667	92	92.66667	89.33333	99	99	98	99	99	98	98
79	80	82	75	78	80	88	87.66667	87.66667	90.66667	94	90	93.33333	95.33333	99	99	98	99	99	100	99
79	80	73	68	70	70	94.66667	94.33333	94.33333	96.66667	92.66667	89.33333	90	89.33333	98	99	98	98	98	98	99
70	67	70	70	72	70	84.66667	86	86	82.33333	84	86.66667	86.33333	86.66667	100	99	98	98	100	98	99
66	67	67	70	68	70	82	76.66667	76.66667	78	80.33333	81.33333	82.66667	81.66667	98	98	99	98	98	98	99
67	70	72	74	70	70	74.33333	83.33333	83.33333	88.66667	91.33333	92	88	86.66667	98	100	99	99	98	98	99
64	68	70	67	70	68	83.33333	79.33333	79.33333	81.33333	82	82.66667	86.66667	80.33333	98	98	99	99	98	99	98
76	80	80	80	80	87	98	96	96	100	100.6667	100	100	104.6667	98	98	99	99	98	99	100
70	70	70	70	67	68	78	82.66667	82.66667	83.33333	80	81.66667	83.33333	85.33333	99	98	99	99	99	99	98
70	70	67	68	70	70	81.33333	84	84	86.66667	84.66667	85.33333	88	86	99	98	99	98	99	99	98
67	67	68	70	65	70	88	90	90	86	88	90	86.66667	90	99	99	100	98	99	99	98
72	76	78	75	70	70	86	86.66667	86.66667	88.66667	88.66667	87.33333	85.33333	86	99	99	98	99	99	99	98
80	82	80	84	80	80	94.66667	96	96	98	96.66667	98.66667	96.66667	97.33333	99	99	98	99	99	99	99
89	80	90	84	86	90	96.66667	102	102	96	102	97	98.66667	103.3333	99	99	98	99	99	98	99
74	72	7	70	70	72	80	90.66667	90.66667	90.33333	46	90	90	90.66667	98	99	98	99	99	99	99
79	80	80	80	80	80	91.66667	94.66667	94.66667	96.66667	98	98.66667	96	95	98	99	99	99	98	99	99
65	68	70	72	67	70	82	80	80	82	86	84	80	83.33333	98	98	99	98	99	98	99
80	78	76	78	80	80	95.33333	99.33333	99.33333	98	97.33333	99.33333	100	100	99	98	99	100	99	98	99
66	65	66	65	68	70	73.33333	77.33333	77.33333	78.33333	80.66667	76	78.66667	80	99	99	99	98	98	98	99

73	74	77	76	77	78	87.66667	90	90	89.33333	92.66667	92.66667	92.66667	92	99	99	99	98	98	99	98
70	78	76	70	72	70	81.33333	86.66667	86.66667	91.33333	89	86.66667	84.66667	86	99	99	99	98	98	99	99
80	82	84	88	76	80	95.33333	100	100	102	103.3333	105.3333	96.66667	100	99	99	99	98	99	99	99
68	70	72	70	70	70	82.66667	82.66667	82.66667	84.66667	87	86.66667	87.33333	86.66667	99	99	99	99	99	99	98
77	76	75	77	70	77	88	92	92	90.66667	86.66667	88	83.33333	87.33333	99	99	99	99	99	98	98
86	90	89	87	90	90	99.33333	100.6667	100.6667	107.3333	106	104.6667	107.3333	106.6667	99	99	98	99	99	98	98
70	76	60	78	80	80	91.33333	93.33333	93.33333	98	72.66667	99.33333	100	99.66667	99	99	99	99	98	99	99
70	80	75	76	72	77	93.33333	88.33333	88.33333	95.33333	92.66667	94	91.33333	94.66667	99	99	99	99	98	99	99
78	80	80	78	72	80	89.33333	87.33333	87.33333	90	93.33333	93.33333	84	93.33333	99	99	98	99	99	99	99
0	82	80	79	78	80	94.66667	43.33333	43.33333	96.66667	96	97.33333	93.66667	96	98	99	99	99	99	99	99
65	66	68	62	64	66	72.66667	79	79	79	81.66667	78	80	77.33333	98	98	99	99	99	99	98
80	82	84	88	78	80	93.33333	94.66667	94.66667	96.66667	97	101.3333	95.33333	93.33333	99	98	98	99	99	98	98
64	66	67	70	70	70	74	78	78	80.66667	81.66667	86.66667	88.66667	86.66667	99	99	98	99	99	100	99
79	70	72	74	76	79	93.66667	94.66667	94.66667	87.66667	88	91.33333	93	94	98	99	98	99	98	98	99
84	85	80	80	82	80	95.66667	99	99	100	97.33333	96	96.33333	96	98	98	99	98	100	98	99
87	80	90	88	86	85	98.66667	104	104	98	103.3333	102.6667	100.6667	102	98	98	99	98	98	98	99
68	70	72	70	70	68	86.66667	86.66667	86.66667	88	89.66667	89	89.33333	85.33333	99	98	99	99	98	98	99
83	84	85	80	86	80	98	98	98	98	98	93.33333	98.66667	96.66667	99	99	99	99	98	99	98
66	68	69	70	72	70	73.33333	84	84	86.66667	88	90	89.66667	88.66667	99	99	98	98	98	99	100
70	72	70	70	72	74	81.33333	82.66667	82.66667	86.66667	86.33333	86.66667	89.33333	89.33333	99	99	98	98	99	99	98
68	70	72	74	75	75	86.66667	87	87	86.66667	87.33333	85.33333	86.66667	87.33333	98	99	99	98	99	99	98
68	70	72	70	68	68	79	82.66667	82.66667	85	86	86.66667	87	83	98	98	99	99	99	99	98
84	88	80	87	86	86	98	101.3333	101.3333	105.3333	97.33333	101.3333	104	103.3333	99	98	99	99	99	99	98
80	78	76	70	75	76	93.33333	95	95	91.33333	89.33333	86.66667	91.33333	90.66667	99	99	99	99	99	99	99
68	63	65	67	70	70	86	87.33333	87.33333	83.33333	82.33333	83	86.33333	86.66667	99	99	99	99	99	98	99
85	88	90	92	89	86	98	99.33333	99.33333	104.6667	103.3333	105.3333	104.6667	104	99	99	98	98	98	99	99
80	86	82	80	84	85	99.33333	94.33333	94.33333	99.33333	93.66667	92.66667	96	95	99	99	100	98	99	99	99
68	70	87	75	77	78	93.33333	80	80	88	97.33333	91.33333	94.66667	95.33333	98	99	98	99	99	98	99
89	90	83	86	87	90	102.6667	105	105	105.3333	98	103	104.6667	105.6667	100	98	98	99	98	98	99
62	60	62	60	60	60	73.33333	74	74	73.33333	78	72	73.33333	73.33333	98	100	98	99	98	98	98
75	76	78	73	75	70	88	92	92	93.33333	95.33333	88	88.66667	86.66667	98	98	98	99	98	99	99
76	78	80	82	80	80	88.33333	90.66667	90.66667	91.33333	92	91.33333	89.33333	91.66667	98	98	99	99	99	99	99
87	89	88	90	85	89	102	102.6667	102.6667	102	105	106.6667	102	103.3333	98	98	99	98	99	99	99

Sp02 24	PONV Y/N	BRADYCARDIA Y/N	HYPOTENSION Y/N	URINARY RETENTION Y/N	RESPIRATORY DEPRESSION Y/N	RESCUE ANALGESIA	PATIENT SATISFACTION	THERAPEUTIC FAILURE
98	0	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	2	0
100	1	NO	NO	NO	NO	NO	3	0
98	3	NO	NO	NO	NO	NO	3	0
99	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	YES	1	1
99	1	NO	NO	NO	NO	YES	2	0
100	0	NO	NO	YES	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	3	0
99	2	NO	NO	NO	NO	NO	3	0
99	1	NO	NO	NO	NO	NO	3	0
100	0	NO	NO	NO	NO	YES	1	1
99	0	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	YES	1	0
100	0	NO	NO	NO	NO	NO	3	0
99	2	NO	NO	NO	NO	NO	2	0
98	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	2	0
100	1	NO	NO	NO	NO	NO	2	0
99	3	NO	NO	NO	NO	NO	3	0
99	1	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	YES	NO	NO	3	0
100	0	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	2	0
98	0	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	2	0
100	0	NO	NO	NO	NO	NO	3	0
99	2	NO	NO	NO	NO	NO	3	0
99	2	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	YES	NO	NO	3	0
98	1	NO	NO	NO	NO	YES	1	0
99	1	NO	NO	NO	NO	NO	3	0
98	1	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	NO	3	0
	0	NO	NO	NO	NO	NO	3	0
	3	NO	NO	NO	NO	NO	3	0
	1	NO	NO	NO	NO	NO	2	0
	0	NO	NO	NO	NO	YES	1	1
	0	NO	NO	NO	NO	NO	2	0
	1	NO	NO	NO	NO	NO	2	0
	0	NO	NO	NO	NO	YES	1	1

	1	NO	NO	NO	NO	NO	2	0
	0	NO	NO	NO	NO	NO	2	0
	0	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	NO	NO	NO	3	0
99	2	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	NO	NO	NO	3	0
98	1	NO	NO	NO	NO	YES	1	1
99	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	NO	NO	YES	1	0
98	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	YES	2	0
99	1	NO	NO	NO	NO	NO	3	0
99	2	NO	NO	NO	NO	NO	3	0
99	1	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	3	0
98	1	NO	NO	YES	NO	NO	3	0
100	0	NO	NO	NO	NO	NO	2	0
98	1	NO	NO	NO	NO	YES	2	0
98	0	NO	NO	NO	NO	NO	3	0
98	1	NO	NO	NO	NO	NO	3	0
98	1	NO	NO	NO	NO	YES	1	0
99	1	NO	NO	YES	NO	NO	2	0
99	1	NO	NO	NO	NO	YES	1	1
99	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	YES	1	0
98	3	NO	NO	NO	NO	YES	1	1
99	1	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	2	0
98	0	NO	NO	NO	NO	NO	2	0
98	0	NO	NO	NO	NO	NO	2	0
98	1	NO	NO	NO	NO	NO	3	0
99	1	NO	NO	YES	NO	NO	2	0
99	1	NO	NO	YES	NO	NO	3	0
99	3	NO	NO	NO	NO	NO	3	0
99	1	NO	NO	NO	NO	NO	3	0
98	2	NO	NO	NO	NO	YES	1	1
98	0	NO	NO	NO	NO	NO	2	0

99	1	NO	NO	NO	NO	NO	3	0
99	3	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	3	0
99	1	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	NO	NO	NO	3	0
100	2	NO	NO	YES	NO	NO	3	0
98	3	NO	NO	NO	NO	NO	2	0
98	1	NO	NO	NO	NO	NO	2	0
98	0	NO	NO	NO	NO	YES	1	1
98	0	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	NO	2	0
99	2	NO	NO	YES	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	YES	2	0
99	0	NO	NO	NO	NO	NO	3	0
99	0	NO	NO	NO	NO	NO	3	0
98	0	NO	NO	NO	NO	NO	2	0
98	1	NO	NO	YES	NO	YES	1	0
99	1	NO	NO	NO	NO	NO	2	0
99	1	NO	NO	NO	NO	NO	2	0
98	3	NO	NO	NO	NO	YES	1	1
98	1	NO	NO	NO	NO	NO	3	0
98	1	NO	NO	NO	NO	NO	3	0
99	2	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	YES	1	1
99	1	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	YES	NO	NO	2	0
98	0	NO	NO	NO	NO	YES	1	1
98	0	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	NO	2	0
99	0	NO	NO	NO	NO	YES	2	0
99	1	NO	NO	NO	NO	YES	1	0